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SURGICAL APPLICATION OF THE RÖNTGEN RAYS.[1]

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During the period of development of any new process of exploration or method of treatment it is useful from time to time to sum up the results accomplished and to compare the views of various workers in the same field. It has seemed to me that a paper on the Röntgen rays, to be of interest or value to this Association, should not be an attempt at an exhaustive review of all the clinical work that has been done by this method, but should rather present for discussion a series of conclusions based upon such work or of questions suggested by it. I have therefore not attempted to prepare a formal paper, but for the sake of bringing the subject up for consideration have tried to formulate tentatively and as concisely as possible the present state of our knowledge as to the surgical applications of skiagraphy, with the hope that my conclusions may be corrected or supplemented by the experience of other members.

The subdivisions of the subject are naturally partly clinical and partly anatomical. I shall take them up *seriatim*, following in a general way the chronological order of their development, and beginning with

Foreign Bodies.—(*a*) It is now possible to say dogmatically that substances more opaque to the rays than the tissues by which they are surrounded, and situated in the limbs, the walls of the chest, abdomen, or pelvis, in the neck, the scalp, or the bones of the cranium, can be discovered and located with entire accuracy by skiagraphs taken from two or more directions.

A single picture, while conclusively demonstrating the presence of the intruder in a given locality, may readily be very misleading as to its exact relation to important structures. If any considerable period

[1] Read before the American Surgical Association, May, 1897.

has elapsed between the taking of the skiagraph and operation, the frequency of movement of foreign bodies in the tissues should not be lost sight of. In one case of my own a needle was shown a quarter of an inch beneath the skin over the upper end of the tibia in a young child. A week intervened. At the operation a distinct induration was felt at this point. On cutting down upon it no needle was to be found there. It was discovered after a careful dissection lying beneath the periosteum at the side of the tibial tubercle. Examples of this well-known mobility of foreign bodies might easily be multiplied. Mr. Turner, of King's College Hospital, has recorded a case (*The Lancet*, June 20, 1896) in which, after six skiagraphs and three operations, a needle in the sole of the foot still eluded the operator. In such instances the possibility of the foreign body having gained access to a tendon sheath should be remembered, as, if it is very small and fine, it might easily be there and escape recognition by touch while search for it was conducted throughout the whole neighboring region.

Dr. Walsh has found (*British Medical Journal*, March 27, 1897) that in those parts of the body where surface-markings exist these markings could be reproduced in a skiagraph by rubbing a little powdered oxide of bismuth into the creases of the skin. He has suggested that in this way a complete surface-map with numerous lines of latitude and longitude could be made available as a guide to the knife of the operator who is searching for a very fine and easily overlooked foreign body.

(*b*) *In the cavities of the body* foreign bodies can be located by a system of triangulation by means of successive skiagraphs having known relations to one another and to a fixed point on the surface of the body next the plate. Exner (*Wien. klin. Woch.*, January 7, 1897) has described a process by means of which he has been able to locate bodies on the fluorescent screen. He places the lamp on one of two graduated arms at right angles to each other, one being perpendicular to and the other parallel with the screen. Measurements are made by pieces of lead sliding upon the perpendicular arm of the stand. Their projection upon the screen determines both the size and the location of the foreign body. The method seems reasonable if views from different directions are taken, but it is open to the objection that in planning an important operation the surgeon must either depend entirely upon the testimony of some one else or take the large amount of time required not only to make such examinations, but also to acquire technical familiarity with the apparatus. If a series of skiagraphs is made they can be studied at leisure, and a permanent record can be kept.

In the *cranial cavity* bullets have been located and removed. The recognition of the bullet seems likely to be easy in the majority of cases. In one of my patients a bullet under the scalp was skiagraphed from the opposite side of the head, the rays thus passing through the two

thicknesses of cranium as well as through the scalp and the brain tissue. The localization is far more difficult. The system of triangulation will probably apply here, but of course clinical symptoms and other methods of exploration, as the telephonic probe, which was used in a case of Fowler's (*Brooklyn Medical Journal*, 1896, p. 755), will always be valuable aids, and at present are almost indispensable.

The fluoroscope has in some instances been more valuable than the skiagraph, bullets being easily seen which could not be made to appear on a negative even after an exposure of an hour, as in a case of Bruce's (*Medical Record*, April 17, 1897). I have found it useful to indicate on the scalp by means of lead wire or lead paint the important localizing lines, as those of the fissure of Rolando, the fissure of Sylvius, Reid's base line, etc., so that the relation of the foreign body to these lines can be at least approximately estimated.

Scheier (*Deutsche med. Wochen.*, October 1, 1896) reports a case in which a bullet was located in the neighborhood of the right Gasserian ganglion five years after it had entered the cranial cavity through a wound just above the outer end of the superciliary ridge. A skiagraph at the time of the accident would have prevented an unnecessary exploration of the orbit which was made at that time.

Eulenberg (*Ibid.*, August 17, 1896) reports two cases, in each of which a bullet in the middle fossa was shown by skiagraphy.

Brissaud and Bonde (*Semaine Méd.*, June 24, 1896) located a bullet in the second temporal convolution. Other cases have been recorded.

In *the thoracic cavity* bullets can be located with reasonable accuracy in the trachea, bronchi, lungs, or pleura. In the case of a boy who swallowed a tack, Poch (*Wien. klin. Woch.*, November 12, 1896) first found the body with the fluoroscope; a skiagraph then showed it to be in the left lung on the level of the sixth intercostal space; two positions of the tube demonstrated that it was near the posterior wall of the thorax, as the shadows cast were not very far apart, and did not fall upon the vertebræ even when the tube was carried well to the left. I quote the case, as it gives in brief an idea of a rapid method of approximate localization.

It is worth mentioning that rubber drainage-tubes in the pleural cavity cannot invariably be detected by the Röntgen method, but seem to be more or less translucent to the rays. In a case of my own a very large-sized tube, which had disappeared and was thought to have been thrown out in the dressings, cast absolutely no shadow on the skiagraph plate, but was easily found and removed by forceps.

There can be little doubt that the difficult decision between operative interference and expectancy in penetrating gunshot wounds of the thorax without wound of exit will be greatly facilitated in the future by the accurate localization of the bullet.

I have now under treatment a young lad who accidentally shot himself with a 22-calibre parlor rifle. The ball entered the wall of the right chest on the mid-axillary line in the sixth interspace. The muzzle of the rifle was pointing upward. The patient complained bitterly of pain under the upper border of the right scapula. The history of the case and all the clinical phenomena would have led to exploration in that region, but the skiagraph shows the bullet in the lower lobe of the lung on a level with the tenth rib and near the middle line of the body. The picture also shows in a convincing manner a pulmonary area (corresponding to the lower lobe) of increased opacity and evidently the seat of blood effusion and inflammation. The patient has all the clinical symptoms of a traumatic pneumonia.

It is obvious that *in the œsophagus* the cases of detection and removal of foreign bodies will be, as they have been, very numerous and very satisfactory. The accuracy with which not only the presence of the intruder but its exact situation can be determined has gone far to resolve the doubts as to the choice of operation which used sometimes to be very grave ones. As the shape and size of the body can also be determined, the surgeon has all the facts which enable him to decide whether to make the attempt at removal by forceps or coin-catcher, to do an œsophagotomy, or to remove the body through the stomach. All of these methods have been successfully employed, and cases have been reported by Péan (*Bull. de l'Acad. de Méd.*, December 9, 1896); Bowlby and Marsh (*Lancet*, January 30, 1897); Raw (*British Medical Journal*, 1896, vol. ii. p. 1678; *Ibid.*, 1896, vol. ii. p. 1677); Bull (*Medical Record*, 1897); A. C. Wood (*University Medical Magazine*, October, 1896), and myself (*Ibid.*, June, 1896).

In the *abdominal cavity* the conditions are about the same as in the thorax. If the foreign body is within the intestinal tract, it is obviously difficult to determine the exact portion thereof which it occupies. A series of skiagraphs might, however, show such progressive motion as to make it evident that the body would be ejected spontaneously, and might thus demonstrate the propriety of expectant treatment. They would also go far to relieve the anxiety of the patient or the family, which is often extreme in these cases. It does not seem unlikely that in appropriate instances the presence of a foreign body in the stomach could be demonstrated by moderately distending that organ with a harmless opaque fluid, like lime-water, and observing whether or not the body disappeared from view. Neither is it impossible that if the shape and size permitted (as a Murphy button, for example) the body might, with the help of the fluoroscope, be seized by appropriately shaped forceps and withdrawn through the œsophagus.

Linderman (*Deut. med. Woch.*, April 22, 1897) demonstrates the outline of a dilated stomach by passing through the œsophagus a soft stomach-

tube armed with a metal mandrin; this follows the greater curvature of the stomach approximately, and by marking the umbilicus with a coin the outline of the viscus can be relatively demonstrated.

Kronberg (*Wien. med. Woch.*, May 23, 1896), arguing from the comparative innocuousness of metallic mercury when introduced into the alimentary canal, and its high atomic weight and associated opacity to x-rays, suggests its use in the diagnosis of affections of the internal viscera, especially intestinal obstruction. The method recommended is to administer a certain quantity of the metal, and to observe its position in the organs by means of skiagraphy. Kronberg has been able to fill practically the whole intestine of small animals with mercury; in larger ones and in the human cadaver he can follow the course of the metal through the gut. In actual practice he considers that one to two hundred grains of mercury should be given in cases of intestinal obstruction from volvulus, intussusception, fecal masses, paralysis, etc. Bettleheim has shown that this alone is in many cases sufficient to effect a cure, and it is claimed that with the aid of Röntgen's method the seat of the obstruction can be diagnosed. Kronberg further points out that the use of mercury in this way may be very valuable in the diagnosis and localization of fistulous tracks and their ramifications in inaccessible parts of the body. In cases in which the use of mercury might be dangerous, he suggests the substitution of the rare metal, gallium, which melts at 30° C., and has only half the atomic weight (and therefore opacity) of quicksilver.

In the *pelvic cavity*, as the ilium, like all other bones, is penetrable by the rays, foreign bodies, if sufficiently opaque, can be found with certainty by taking skiagraphs with the patient in various positions.

In dismissing the subject of foreign bodies, I must allude to the great satisfaction the Röntgen method has given in dealing with the not uncommon class of patients who have imaginary foreign bodies and equally imaginary symptoms. Such persons, who formerly wandered from surgeon to surgeon until they found one willing to undertake an operation, and who then blamed him for not producing the supposititious cause of their troubles, can now be convinced and usually cured by a few minutes' exposure to the x-rays.

Fractures and Luxations.—*Fractures of the skull* are so often difficult of recognition without operation that any addition to our diagnostic resources in this direction is greatly to be desired. Especially is it to be hoped that we may be able by the skiagraph to recognize (*a*) fracture of the inner table, (*b*) linear fracture, (*c*) fracture of the base.

The first two should be possible, though I can find no record of the work being done clinically. It has been done for me experimentally with entire success.

The skiagraphing of fracture of the base bristles with technical diffi-

culties, but they do not seem to me to be insuperable. Many skiagraphs of normal skulls in living persons must first be made and studied, so that normal lines and shadows may be easily recognized.

Afterward the line of a fracture might, perhaps, be differentiated. Depressed fracture of the vault ought to be demonstrable in the majority of cases.

Fractures and dislocations of the spine.—Here, also, the obscurity of many cases will almost certainly in the future be resolved by skiagraphy with resulting benefit to both prognosis and treatment. If fractures without displacement could be recognized and distinguished from those more common ones in which dislocation has also occurred and persists, and if in the latter the exact degree of luxation could be seen and, therefore, the probable extent of the cord lesion estimated, we would have for the first time a satisfactory basis for deciding upon the method of treatment to be adopted in those distressing cases.

This work has been begun for me on the cadaver with moderate success, but the normal spine has been so often skiagraphed, both anteroposteriorly and laterally, that there seems to be no reason why we should not soon apply the method to patients who have sustained spinal injuries.

In fracture of the *sternum*, the *scapula*, the *clavicle*, and the *pelvic bones*, while I believe that no work of special importance has been reported, it is evident that the Röntgen method is competent to give us great help in obscure cases. In these instances, as in all cases where the shadow of one bone is necessarily superimposed upon that of another, the technical difficulties to be overcome in demonstrating abnormality are much increased. This remark also applies to all cases, either of fracture or dislocation, where it is impossible to get an entirely satisfactory view from both antero-posterior and lateral stand-points, as in lesions about the shoulder-joint or the hip-joint. In such regions, for example, absence of the head of the bone from its normal position can be demonstrated easily, but it is more difficult to show the exact position occupied by the displaced bone.

The *ribs* present special difficulties on account of the movements of respiration, but the latter in doubtful cases can be much restricted by a fixed dressing not opaque to the rays, like sodium silicate, and a skiagraph should then show the fracture, if there be one.

Fracture and luxation of *the bones of the extremities* (with the above-mentioned exceptions) can readily be demonstrated. In ordinary cases, skiagraphy does not seem essential to the management of these fractures, but there are very many cases in which it assumes great practical importance. As examples I may mention: (*a*) Fractures attended with so much swelling of surrounding tissues that satisfactory palpation of the fragments is impossible. In such cases, although the setting of the fracture may really have been entirely accurate, the uncertainty often

leads to another examination at an early date, and thus to unnecessary disturbance of the parts at a time when absolute quiet is important; or, to take the reverse of the picture, the professional attendant may have remained in ignorance of a faulty position of the fragments, which could be recognized only after the subsidence of swelling and too late for rectification, and which would result in permanent deformity or disability.

(*b*) Fractures about joints. The escape or the involvement of the joint in these cases is often a matter of doubt. The opinion arrived at influences both prognosis and treatment. Sometimes, especially in the smaller bones, as the phalanges, the decision as to the presence or absence of a fracture in the immediate neighborhood of a joint is exceedingly difficult to arrive at by ordinary methods, crepitus often being absent, and preternatural mobility being readily confused with the joint motion.

(*c*) In epiphyseal separations, where also crepitus is often absent and the proximity to the joint confusing, the deformity is slight and the patient frequently so young that no information can be obtained as to the occurrence of traumatism or as to subjective symptoms.

(*d*) A few special fractures, chief among which is fracture of the femoral neck. If the presence or absence of this fracture in the many doubtful cases could be conclusively shown, and, still better, if it could be demonstrated in a given case whether or not the fracture was exclusively intra-capsular, most valuable information obviously affecting both prognosis and treatment would be acquired.

Mr. Rowland (*British Medical Journal*, December 5, 1896) has recorded a case in which he diagnosticated a fracture of the neck of the femur in an adult of muscular build, who was six feet in height. The negative would not admit of printing, but it was sufficiently distinct to furnish a tracing, which was of great use in directing the treatment. Wullstein (*Berliner klin. Woch.*, April 19, 1897) reports a similar case, and another in which the differential diagnosis between fracture of the neck of the femur and luxation was made by a skiagraph. This fracture has been produced in the cadaver and an excellent skiagraph of it made for me.

Fractures of the os calcis and of the astragalus, both occasionally somewhat difficult of detection, have been shown clearly. I have had cases of each.

In certain special fractures the Röntgen method has been applied with very satisfactory results. The exact nature of the injury has been shown in a number of cases of fracture of the lower end of the radius by Conant (*Boston Medical and Surgical Journal*, April 15, 1897).

Ununited fracture, even in the presence of close fibrous union, can be demonstrated with great accuracy, and if several views are taken the rays can usually be made to show the exact line and extent of the fracture. I have found this in several cases a great convenience as enabling me definitely to plan the operation in advance, and to decide upon the

particular method to be employed for the purpose of fixation—silver wire, steel pins, or a plate and screws. Work has already been begun in the study of the repair of fractures, and it is now possible to determine the presence or absence of the lime salts in the bond of union between the fragments. This, we may venture to hope, will in some cases prove of valuable assistance in determining the time of removal of the original dressing or the original splints, and, when necessary, the prolongation of the period of treatment in cases with a tendency to delayed union or to non-union, as shown by continued translucency of the callus.

If the fixed dressing is made of one of the silicates the further progress of the case may even be watched through it, and the need for more active measures, such as friction of the fragments on each other, may be thus determined.

If the ambulatory treatment of fractures of the lower extremity gains in favor, the ability to note the presence or absence of deformity, if some material not, like plaster, opaque to the rays can be used, will remove one of the greatest practical objections to the method.

I do not mean to assert that all this is possible at the present time, but I believe it will be a development of the near future.

In the disability following old fractures near joints and complicated luxations I have found skiagraphs of the region to be of the greatest help in determining the mechanical cause of the limitation of motion, and in deciding whether excision of the joint involved or some less radical procedure should be adopted.

Before leaving the subject of fractures, it may be well to present for discussion a few questions having a medico-legal bearing, even although it may not be possible at present to answer them finally.

We may begin by asking whether skiagraphy has as yet given us a better understanding of fractures in general, or has been the means of suggesting more efficient treatment.

It is difficult in reply to point to any one definite addition to our knowledge of these injuries, and so far as I know no material modification of the general rules governing the treatment either of fractures generally or of any specific fracture has as yet resulted; but in individual cases, such as have been described above, it has certainly been of great utility, and is likely to become more valuable as technique improves and experience increases.

The question whether or not the patient has the right to demand, as ordinary care, that the medical attendant should have a skiagraph of the fracture taken, I would at this time unhesitatingly answer in the negative. Until a much larger number of cases have been observed and the pictures and the clinical results have been compared, the routine use of skiagraphy might be more harmful than useful.

Mr. Gerard Smith has called attention (*British Medical Journal*,

November 14, 1896) to the necessity for eliminating the errors due to distortion of the image, owing to the want of parallelism of the objects, the rays, and the plate, or screen, respectively. As he says, the most extraordinary apparent deformities of the bones, in the shape of bendings, enlargements, and even of partial dislocation, can be produced both on the screen and the plate, by varying the angles and position the rays make with the limbs and the receiving surface. Mr. Cottam (*Ibid.*, February 6th) carefully examined skiagraphs published in the *British Medical Journal*, purporting to show fractures of the styloid process of each ulna in a case of double Colles fracture. He states that on comparing them with his own skiagraphs of the normal wrist and with those of an old-standing Colles fracture, he found that in the *British Medical Journal* pictures the styloid process of the ulna was in its normal position on each side and was unbroken.

Whether he or the previous reporter was correct is immaterial. The incident well illustrates the point I desire to make in reference to the undesirability, at least at present, of favoring the routine use of skiagraphy as an essential in the diagnosis and treatment of all fractures.

There can be no doubt, however, that skiagraphs will figure largely in suits for damages after accidents and in cases of alleged malpractice. They have already been admitted as evidence in such cases, and it is probable that juries will, with increasing frequency, have to decide whether to place greater weight on deformity as shown by skiagraphs, or on expert evidence as to the absence of genuine disability. It seems obvious that each case must be studied by itself; but that it would be injudicious, if not altogether unwarranted, for us to assume at present that clinical experience and the judgment based upon it should be subordinated to the pictorial testimony of the skiagraph.

It is not, however, too soon to advise that in all obscure, complicated, and unusually difficult cases the help afforded by the Röntgen rays shall be secured by the surgeon, even if it is done chiefly with a view to his own protection.

As time goes on it is probable that we shall be better able to estimate accurately the precise clinical value of minor deformities. In the mean time, it seems to me, we should be careful to avoid the setting up of an impossible ideal as a standard in fracture cases.

Diseases of Bones and Joints.—It now appears to be beyond reasonable doubt that in the future we shall be able to make a definite diagnosis and to decide upon the form of treatment earlier than heretofore, in a large variety of cases involving the bones and the articulations. Rowland (*British Medical Journal*, October 3, 1896) has been able with facility to recognize caries of the cervical spine. Macintyre (*Ibid.*) has made excellent pictures of early tubercular disease of the hip in children. The former (*Ibid.*) has also shown the lesions of rheu-

matoid arthritis in the shoulder. Osteoma is, of course, easy of recognition. Intracranial exostosis and the ravages of osseous gummata in the same region should be demonstrable.

Göbel (*Deut. med. Woch.*, April 22, 1897) observed, in a case of osteomalacia that had had multiple fractures of different bones, that there were no shadows thrown by the bones, although they were perfectly distinct in other normal cases with the same tube. A comparison of the various bones of this patient with those of healthy individuals showed that they were much more translucent, the marrow cavity being transparent, while the wall of the bone was only visible at the margins of the bone-shadows. This was accounted for by the decreased amount of bone-salts. The study of rhachitis should give valuable and probably analogous results.

I have been able in the long bones to locate the site of the disease in cases of central abscess, caseous degeneration, and osteosarcoma. The pictures, with or without the aid of clinical symptoms, would in several such cases have been conclusive as to the exact position of the lesion. But the accurate differentiation of these diseases by the skiagraph has not yet been possible in my experience. In each case there is an absorption or diminution of lime-salts, producing a similar decrease of opacity over the affected area, whether the bone is the seat of a neoplasm, is the subject of cheesy or fatty metamorphosis, or is occupied by a collection of pus. It is probable that we shall learn later to distinguish between these conditions. At any rate, with but slight additions to the knowledge we now have, we shall be in a position to recommend operation earlier and to plan it more accurately than was formerly the case. In tubercular disease of joints, for example, we may be able to determine and to remove the original focus of disease before the articulation becomes seriously affected; we may obtain much help in making the choice between erasion and excision; we may determine in advance of operation in children whether or not the neighboring epiphyses are involved, and so decide between excision and amputation. Wullstein (*loc. cit.*) has demonstrated the different stages of coxitis in children.

In congenital luxations of the hip the condition of the acetabulum and of the femur have been shown and studied. In all varieties of talipes the precise relation of the bones to each other, the amount necessary to remove, if osteotomy is necessary, and the probable efficiency of orthopedic apparatus can be worked out almost as if the dissected specimen were available. (Barwell, *Lancet*, vol. ii., 1896, January 30, 1897.)

In Pott's disease not only can the carious vertebra be shown, but by aspiration of the resultant abscess and injection with iodoform emulsion the cavity and ramifications of the abscess up to its vertebral origin can be clearly demonstrated. This has been done for me with entire success. The changes produced by rheumatoid arthritis can be clearly seen, as I

have already said, and it seems to me that it would be interesting to study by skiagraphy the condition of such joints while undergoing the latest and in some respects the most promising method of treatment—that by superheated dry air. I have arranged to have this observation made.

In a case of arthritis deformans affecting the cervical spine the pathological changes were shown for me in detail: the tendons of the spinal muscles involved were the subject of calcification.

Periarthritis ought in doubtful cases to be more clearly distinguishable from true joint-disease. The mechanism of metatarsalgia has been shown and its diagnosis greatly facilitated by skiagraphy. (Morton, *International Medical Magazine*, 1896, p. 329.) Floating bodies in the knee-joint have been seen, as in a case reported by Weir (*Medical Record*, April 3, 1897), and bodies connected with bursæ, as in the same case.

On the whole, it is evident that skiagraphy has added, and is likely to continue to add, to the definiteness and precision of our management of many forms of disease of bones and joints.

Returning to the cavities of the body (which I have only considered in relation to intruders from without), it would appear that in a number of conditions in which surgeons and physicians are almost equally interested, the x-rays are likely to be of great service. I have already mentioned a case of gunshot wound followed by traumatic pneumonia and now under observation. If in that instance the pneumonia proves to be septic and suppuration ensues, as shown by the clinical symptoms (or possibly by the skiagraph itself), I shall be in a position to open and drain the lung abscess far sooner and more efficiently than if I were compelled to base my action solely on physical diagnosis. As Bouchard has been able clearly to recognize pleural effusions, patches of consolidation in the lungs, and pulmonary cavities (*Semaine Méd.*, December 9 and 23, 1896), it is conceivable that we may with advantage extend the field of operation in at least the latter class of cases. Grummach (*Berlin klin. Woch.*, June, 1896) has made a similar series of observations, as has Williams, of Boston (*Boston Med. and Surg. Journ.*, Oct. 1, 1896).

The fluoroscope seems likely in these cases, as in various forms of cardiac disease, to be more useful than the skiagraph, as the latter in the case of organs in motion can only give the net result during the period of exposure. With fluoroscopic help, for example, we may be able in suspected pericardial effusions to employ paracentesis more frequently and more successfully. Mediastinal disease of various sorts should also be more easily discoverable in the early stages. Leonard has shown (*University Medical Magazine*, 1896, p. 237) the possibility of recognizing and outlining intrathoracic aneurism.

The diagnosis between supra- and infra-diaphragmatic abscess, often extremely difficult, may be aided by a comparison of the density of shadow in the affected region with the normal standard. This is yet to be established, and only by many observations and records.

In all this work, in fact, it must be understood that we are as yet merely on the threshold. I am talking of what seems to me to be possibilities, with the desire either of having their impracticability shown, if it exists, or, on the other hand, of aiding in the development of the method along these lines. It should be remembered, however, in estimating the future of skiagraphy, that by variations in the time of exposure, the length of focus, etc., it is possible to photograph certain portions of the trunk and omit others—to take the spine, for example, and omit the heart and sternum, or *vice versa*. The heart in action, the diaphragm in motion, the limits of the pleural cavities having all been seen, the extension of the method in the directions indicated seems, on the whole, likely soon to occur. (Macintyre, *Lancet*, August 15 and 22, 1896.)

Below the diaphragm the most interesting unsettled points relate to the value of the Röntgen rays in determining with certainty the presence or absence of various forms of calculi. As to gall-stones, it has long been known that outside of the body they cast a distinct shadow which Mr. Morris (*Lancet*, November 14, 1896) estimates at half the density of the shadow of the uric-acid calculus. Gall-stones have also been shown clearly when placed in the gall-bladder of a cadaver. In actual practice, however, in cases associated with jaundice, with excess of bile in the gall-bladder, or with chronic inflammation and thickening of the surrounding tissues, they have not yet been well demonstrated.

The opacity of the tissues around them, especially when impregnated with bile-salts, is so similar to that of the calculi themselves, that the latter do not show in the fully developed negative. In three cases in my practice they have been seen during the process of development of the plate, and were subsequently found and removed by operation, but no print showing their shadows was obtainable.

Experiment is constantly going on now to determine the amount of exposure necessary in different cases for the rays to penetrate the ordinary tissues without also penetrating the calculi. It will be seen that in gall-bladder cases this will vary with the thickness of the abdominal walls, the presence or absence of jaundice or its degrees, the depth of the calculi from the surface, etc., and that much experience will be required before the diagnosis can be made with certainty. At present it is safe to say that while in some cases the shadow cast by gall-stones warrants a positive assertion of their presence, the absence of such shadow does not demonstrate their absence.

The above remarks apply without modification to *enteroliths*.

Renal calculi have been found in various cases, and successful operations have been based on the skiagraphic evidence (Macintyre, *British Medical Journal*, July 25, 1896). Swain has had a similar case. He has shown (*Bristol Medico-Chirurgical Journal*, March, 1897), as have others, that oxalic calculi are almost impermeable to the rays, the shadow being correspondingly dense; phosphatic calculi come next,

casting a fairly deep shadow, and then, though much fainter, come uric-acid calculi, not very far removed in impenetrability from bile-stones. As uric acid is so frequently the predominating constituent of renal calculi, it is evident that the remarks as to time of exposure, the variation with the individual, etc., made in reference to the search for gall-stones or for intestinal calculi, are applicable also to these cases. There can be little doubt, however, that we shall soon be able to diagnose renal calculi of every variety with almost unvarying accuracy.

Vesical calculi are more difficult, on account of the superposition of the bones of the pelvis. The cases in which the skiagraph would be of most value are those of pouched bladder or partially encysted calculus associated with enlarged prostate. Of course, if the enlargement prevents the introduction of a metal instrument into the bladder, the advantage of a skiagraph would be exceptionally great. Unfortunately, the conditions which indicate the need for such a picture are also unfavorable to its production.

Experiment shows that stones can be clearly seen in an ordinary adult bladder. In a boy of eight the stone has been shown *in situ* (Lawrie, *Lancet*, January 16, 1897).

Foreign bodies, such as hair-pins, have been seen and removed (Leiffert, *Centralblatt für Gynäkologie*, No. 1, 1897). If, as seems probable, we can apply the method to the above-mentioned class of cases and to the exploration of the bladder after litholapaxy, we shall owe to it another marked addition to our surgical resources.

Ureteral stone has not yet been seen clinically, but seems likely to be easy of recognition.

I am having made at present a series of observations on the opacity of various materials used in surgery as antiseptics and for dressings or in the form of lotions or local applications. It seems desirable that we should know what materials should be selected in cases in which it is possible that skiagraphy may be required without disturbance of dressings. The results, with which I need not now detain you, will be incorporated with this paper when it is published.

The apparent toxic effect of the rays upon the skin of operators and subjects, producing dermatitis, alopecia, loss of the nails, and even, according to Gilchrist (*Johns Hopkins Hospital Bulletin*, March, 1897), an osteoplastic periostitis and osteitis (as shown by the skiagraph and by the clinical symptoms), has been widely discussed of late. Several dozen cases have been reported. It seems probable at this time that it is not merely an effect of close contact with the electric current employed, and is not due to any of the chemicals used, but is a specific effect of the rays themselves, some persons being more susceptible than others. Dr. Thorne has asserted that in two instances, after a prolonged examination of the heart, that organ has demonstrably diminished in

size, in one case by as much as two inches. The observation remains unconfirmed, and is contradicted by Dr. Thomson (*British Medical Journal*, October 24 and November 7, 1896).

The possible therapeutic properties of the rays have from the first engaged the attention of some members of our profession. They were thought to be germicidal, and a positive announcement to this effect was made, but was soon with equal positiveness denied. Quite recently (*Semaine Méd.*, January 20, 1897) Rendu has revived the matter by reporting the case of a man, aged twenty years, who had an illness, beginning with characteristic typhoid symptoms and followed by typical infective pneumonia. Pure cultures of staphylococcus were found in the sputum. After an incomplete defervescence the fever returned, and all the signs of suppuration of the pleura or lung developed. Examination of the sputum, which could only be obtained twice, showed a few tubercle bacilli, but the respective parts played by the staphylococcus and the bacillus could not be determined. Whatever the exact nature of the disease, the patient, at the end of six weeks' illness, with hectic temperature, appeared to be dying. He was then exposed to the Röntgen rays for fifty-five minutes every day. After the fourth exposure the temperature fell by crisis, and never rose again. This was accompanied by diuresis and diaphoresis, and the patient was soon quite well. This may have been a coincidence, but no other change in the treatment or conditions was made. After ten applications erythema and ulceration of the skin appeared, and it is possible that equally marked trophic changes took place in the deeper tissues also. In the discussion which followed the paper, Du Castel thought the success of the treatment pointed to the staphylococcus being the cause of the illness, since all the attempts to prevent the development of tuberculosis by the same means had hitherto failed.

I must confess that, as with every new discovery, my thoughts turn to its possible application to a subject which has an invincible attraction for me—the cure of cancer. I was led in a purely speculative and empirical manner to direct the use of the x-rays in a number of inoperable cases of cancer in various regions. My small hopes of success were bolstered up somewhat by reflections upon the hypothetical bacterial cause of cancer, upon the wonderful effect of sunlight on the tubercle bacillus, upon the remembrance that the most powerful germicidal effects of the sun are caused by the rays near the violet end of the spectrum and having the most chemical activity, and that Röntgen rays are ultra-violet and possess chemical activity (Lyon, *British Medical Journal*, February 1, 1896, and Bowles, *Ibid.*, March 1, 1896), and finally upon early vague reports of trophic changes produced by the x-rays.

I have no results to report. Indeed, as yet, I have no results at all, but I was surprised to find that what last fall seemed to me an entirely original thought had occurred to V. Despeignes, who in July and

August, 1896, had reported in the *Lyon Médical* a case of gastric carcinoma which had appeared to be greatly benefited by the transmission of the rays through the seat of disease. More recently the same gentleman states (*Lyon Médical*, December 28, 1896; *British Medical Journal*, February 20, 1897) that after the report of his case appeared he received a communication from L. Voight, Director of the Vaccine Institute of Hamburg, giving an account of the following case: The patient was a man aged eighty-three years, who had complained for nine months of difficulty in swallowing and of pain in the left ear and in the occipital and cervical distributions of the left facial nerve. There was a small epithelial chancroid ulcer in the mouth, starting from the lingual fold, with an enlarged gland in the submaxillary region. Salivation was continual and pain so severe as to require regular administration of morphine. On August 28th the application of Röntgen rays was begun with an apparatus yielding sparks of 10 cm., used in two daily sittings of one-half and sometimes one-quarter of an hour; the pain almost immediately diminished so much that the morphine was discontinued, except an occasional dose at night to induce sleep. The patient was beginning to hope for a cure, but the disease invaded the left part of the tongue; salivation did not cease, and the difficulty in swallowing increased. The patient became emaciated, and died on October 22d of pneumonia, after one hundred applications of the rays, which gave him considerable relief. The good effect of the rays was not attributed to suggestion, because it lasted eight weeks, nor to destruction of sensory nerves, since, as a matter of fact, these were not destroyed. The growth did not, as in Despeignes' case, diminish in volume. Voight thinks that it may, however, be taken as proved that, if the rays have little or no action on the evolution of the disease, their anæsthetic effect is very marked. It may be added that after the eightieth sitting the skin of the left cervical region became almost as black as that of a negro; a similar pigmentation took place on the right side when the rays were directed upon that side.

I intend to continue my own experiments until I am convinced that they are useless.

In the mean time the increasing evidence as to the trophic changes apparently produced by the rays have led me to resolve in addition to extend their attempted therapeutic use to those cases of extensive capil lary nævus which sometimes make such hideous deformities, to similar cases of hairy moles, to inoperable cases of keloid and hypertrophied cicatrix, and to analogous cases not adapted to removal by the knife or amenable to other well-established surgical procedures.

I feel reasonably sure, as in the cancer cases, of doing my patients no harm, even if the experiment is an entire failure.[1]

[1] The skiagraphs which illustrate this paper were made by Dr. C. L. Leonard at the Hospital of the University of Pennsylvania.

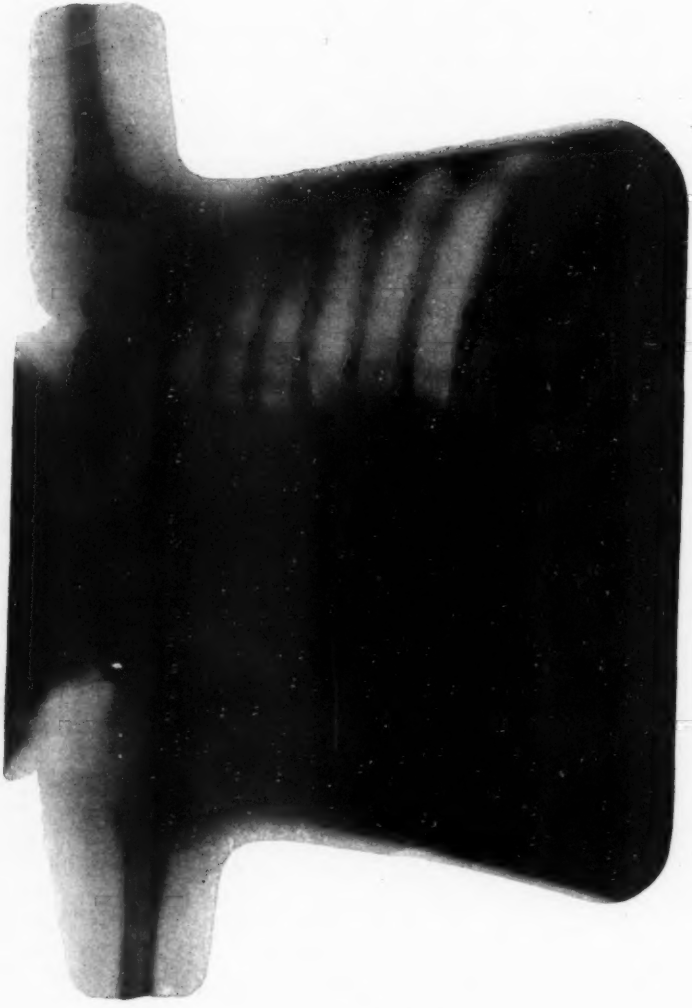


FIG. 1. Penny in œsophagus of child.

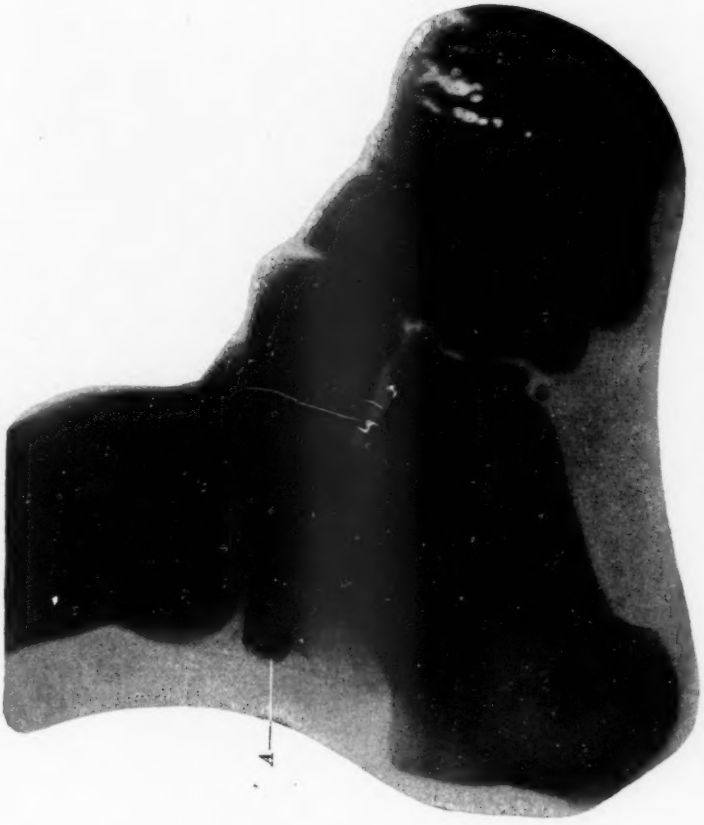


FIG. 2.

A. Bullet in astragalus.

FIG. 3.

Fracture of the styloid process of the ulna.

FIG. 4.

Dislocation at metatarso-phalangeal articulation of great toe.

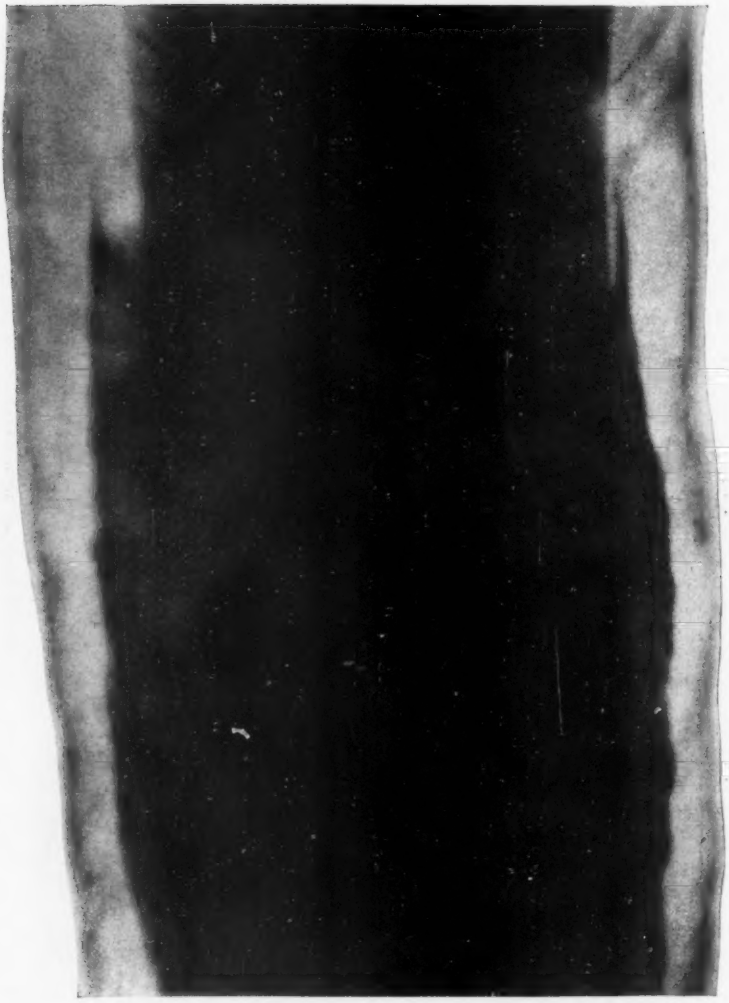
FIG. 5.

Fracture of os calcis; a comparison with the normal shows a marked change in the relative positions of the bones, especially the astragalus and os calcis.

FIG. 6.

Normal foot of fracture of os calcis.

FIG. 7.



Excision of the knee. Result as shown through a plaster-of-Paris dressing. The mottled appearance is due to the varying thickness of the plaster.

FIG. 8.

Epiphysitis of proximal epiphysis of humerus.

FIG. 9.

Normal of epiphysitis case.

FIG. 10.

Tubercular osteomyelitis of tibia. Compare with normal. (Right.)

FIG. 11.

Normal of osteomyelitis case. (Left.)

ON CHRONIC SYMMETRICAL ENLARGEMENT OF THE SALIVARY AND LACHRYMAL GLANDS.

By William Osler, M.D.,
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In the second edition of my *Text-book of Medicine*, issued in 1895, under the heading of "Chronic Parotitis" I mention the case of a young girl, aged thirteen years, then under my care, "who has had for nearly a year enlargement of all the salivary glands, the lachrymal glands, the buccal mucous glands, and the spleen." The case interested me a great deal, and I searched in the literature at my disposal without finding any condition exactly like it. I had overlooked the fact that Mikulicz,[1] in 1892, had described the condition as a characterized form of chronic disease previously unrecognized. His patient, a man, aged forty-seven years, for seven months had symmetrical enlargement of the lachrymal glands, and subsequently of all the salivary glands.

Quite recently Kümmel[2] has met with a series of cases, and has collected one or two which had been previously described in the literature. His first case, a man, aged thirty-three years, had swelling of the salivary and both lachrymal glands in association with chronic hypertrophic rhinitis and asthma. He was cured by arsenic. The second case was a man, aged twenty-five years, who had had for two years slight swelling of all the salivary and lachrymal glands. The third case was a man, aged twenty-eight years, who had enlargement of all the salivary glands, particularly of the right parotid. The buccal and lachrymal glands were not enlarged. The fourth case, a woman, aged twenty-seven years, had swelling of both parotids and submaxillaries of two years' duration. The lachrymal glands were not involved. She had also a dry mouth. Both of these cases followed influenza. The fifth case, a man, aged forty-seven years, had swelling of both parotids only, of some years' duration. The sixth case was a woman, aged twenty-three years, in whom the submaxillary glands were swollen for six months. The other cases in the literature were the one of Mikulicz, already spoken of; one of Tietze, a male, aged thirty-six years, who for ten years had swelling of the parotid glands, and for four years swelling of the lachrymal glands. The ninth case was reported by Hallenhoff: a girl, aged twelve years, had for four months enlargement of the lachrymal, parotid, and submaxillary glands. Very full abstracts of these cases are given in Kümmel's paper.

[1] Bruns' Beitrage (Billroth's Festschrift, 1892).
[2] Mittheilungen aus dem Grenzgebeiten der Medicin und Chirurgie, Bd. ii., 1897.

The history of the case which has been under my observation is as follows:

For more than a year enlargement of the lachrymal, salivary, and buccal mucous glands; enlargement of the spleen; syphilitic rhinitis; tuberculosis of the pleura and lungs; death. Hannah W., aged eleven years, colored, was admitted March 30, 1894, complaining of swollen glands in the neck.

Family History.—Father living, but delicate; mother died of typhoid fever. One sister has had convulsions. She has two brothers and several sisters, all of whom are healthy.

Personal History.—It is difficult to get any satisfactory account from her or her relatives. She says she has always been very well. Two years ago she had chills and fever for a month.

Present Illness.—Six weeks ago she began to feel dull and heavy, and the woman with whom she lived noticed that her face and neck were a little swollen. She did not complain of any pain. At the same time she had slight sores in the mouth and a discharge from the nose.

I saw her on March 31st, and dictated the following note: The child is well nourished, and has a good color; the tongue is clean. The eyes

are a little prominent. A remarkable feature is the symmetrical enlargement of both parotid glands, which stand out very prominently and tilt up the lobes of the ears. To the touch they are painless, and have a firm, board-like hardness. The outlines and lobulations of the glands can be felt with the greatest distinctness. The orifices of the ducts are a little swollen and firm, and a little mucus can be pressed out. Both submaxillary glands are enlarged and firm and hard. The sublingual glands can also be seen as a prominent nodular mass beneath the skin. The child's eyes are naturally prominent, but what adds strikingly to this feature is an enlargement of the lachrymal glands, causing marked bulging just above the outer canthus of each eye. They can be readily felt, and the lobulations are quite distinct. Just within the lower lip there is a small group of enlarged mucous glands. Just beyond the angle of the mouth on either side there are groups of the buccal glands, ten or twelve in number, greatly enlarged, the size of small peas. No other of the buccal glands are enlarged. The tonsils are moderately swollen. The accompanying figure, from a photograph, shows well the enlargement of the salivary glands, but not that of the lachrymal.

At the time of her admission there was no discharge from the nose. There were no signs of interstitial keratitis, and the upper central incisor teeth were well formed. There was slight general enlargement of the lymphatic glands over the body, particularly of those in the posterior cervical triangles. The spleen was enlarged; the edge could be easily felt beneath the costal border, and on deep inspiration the notch could be felt. The liver was not enlarged. The urine was of a natural yellow color, acid reaction, specific gravity 1025, and contained no albumin. The child remained under observation for more than a year. Cultures made from the mucus squeezed from the parotid ducts were negative.

Throughout the summer of 1894 the condition of the glands remained about the same. In June, before I went for my vacation, I noted that "the glands are still large and hard, without any special change." The spleen was perhaps a little smaller.

On October 1st I made the following note: "The right parotid gland is now smaller than the left. The right submaxillary and right sublingual glands are somewhat larger than they were in June. The lymph glands in the posterior cervical triangle have increased in size. The lachrymal glands have become somewhat smaller. The spleen is still to be felt nearly two fingers' breadth below the costal margin. The enlargement of the buccal glands persists." Several careful examinations of the blood were made throughout the spring and summer. The highest count of leucocytes was 10,300 per c.c. There was never any anæmia; the red blood-corpuscles were usually above normal.

In October and November she had a good deal of swelling of the nose, with elevation of the bridge, and Dr. Warfield reported that there was a good deal of thickening of the cartilaginous septum.

Throughout January and February there was distinct ulceration, which Dr. Warfield regarded as syphilitic, and she was ordered the iodide of potassium and mercurial inunctions.

In March, 1895, the right lachrymal gland became very much reduced in size, and was hardly perceptible. The left remained as large as previously. On March 27th she had a slight aphthous sore-throat, which was followed by an increase in the enlargement of the salivary glands, particularly of the right parotid and its extension on the cheek.

On April 6, 1895, she began to be feverish, and had pain in the right side of the chest, due to an attack of acute pleurisy with effusion. She had irregular fever through April and May. She gradually improved, and it was noticed throughout May and June that the swelling of the salivary and lachrymal glands had gradually reduced, and on July 19th it was noted that the parotid glands were no longer enlarged. The swelling of the submaxillary and sublingual glands had also disappeared, and the buccal glands were no longer to be seen.

On my return in September, 1895, I noted that there was a complete disappearance of the enlarged glands, and the spleen could only just be felt on the deepest inspiration.

The subsequent history of this case may be briefly referred to. She was readmitted to the hospital April 18, 1897, with signs of chronic pulmonary tuberculosis, with cavities at the right base. She died in July, 1897.

Dr. Livingood, who performed the autopsy, tells me that the lachrymal glands were represented by fibrous structure, and there was at the time of the autopsy no trace of any enlargement of the salivary glands.

When this case first came under observation I thought that possibly it was associated with an inherited syphilis, and this seemed to be borne out by the subsequent development of a rhinitis, regarded by Dr. Warfield as syphilitic. This opinion appeared to be borne out by the gradual disappearance of the swellings, slowly, it is true, under the use of mercury and the iodide of potassium. It is interesting to note that swelling of one or both parotids may occur in secondary syphilis, an instance of which was at that time under observation in a student. Enlargement of the spleen, as in the case here reported, is not mentioned in any of the other cases. Subsequently the question arose as to the possibility of a tuberculous affection of the glands, an idea not confirmed by the subsequent history.

Both Mikulicz and Kümmel regard the disease as a chronic infection of as yet unknown origin. The enlargement of the glands may persist for months or years; causes no general disturbance; is painless. The condition occurs, as a rule, in persons at the middle period of life. Kümmel has made a careful histological study of the enlarged glands, and finds a complete substitution of the normal tissue by leucocytes. He suggests the name *achroöcytosis*, indicating a replacement by colorless corpuscles of the glandular elements.

The condition, though not serious, is unsightly, and on this account troublesome. Arsenic seems to have been very beneficial in several cases, and should it fail, iodide of potassium should be used.

THE CLINICAL ASPECTS OF THE "INTERNAL SECRETIONS."[1]

(NATURE OF THE THYROIDAL CACHEXIAS, INFANTILISM, ACROMEGALY, GRAVES'S DISEASE).

By James J. Putnam, M.D.,
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The clinical observations which have been made during the past few years with regard to the cachexias following thyroidal disease have not greatly changed our views of the fundamental problems of thyroidal pathology, and, interesting as they are in detail,[2] there are not many of them which have seemed to me appropriate for a brief and general discussion such as this, more especially since they have received such thorough treatment, within the past year, in the monographs of Ewald,[3] Buschan,[4] and Pel,[5] and at the hands of the readers who have preceded me this afternoon in presenting the pathological, physiological, and therapeutical aspects of the subject of the "internal secretions." I shall, therefore, so far as the time at my disposal allows, consider some of the analogies and contrasts between the effects of disease or removal of the thyroid, the generative organs, and the pituitary body, in the hope of gaining in this way wider conceptions of the nature of the influences at work in one or another special case. For it is obvious that wider conceptions are not only of theoretic interest in this connection, but that without them we shall never penetrate the shroud of mystery which envelops the functions and diseases of these organs.

The researches which have been made hitherto into the pathology and clinical history of the diseases of thyroidal origin—whether those of thyroidal deficiency, such as myxœdema, or those assumed to be due to excess or alteration of the thyroidal secretions, of which Graves's disease is the prominent representative—have been conducted, very properly, with the object of defining such types of disease as were well marked and of determinable etiology, and separating them from the more or less miscellaneous affections with which they might be confounded.

But, important as this analytic method has been and will continue to be, it cannot be regarded as likely to give us all the information that we need. We are rather in the habit of assuming that the removal of large portions of the thyroid does no harm, provided it does not cause

[1] Read at the Congress of Physicians and Surgeons in Washington, May, 1897.

[2] Among the most important are the investigations into the metabolism of the thyroidal diseases, but they are not suited for brief analysis.

[3] Die Erkrankungen des Schilddrüse, Myxœdem. u. Cretinismus. Nothnagel's Spec. Path. u. Therapie. Band lxxxviii.

[4] Urb. Myxœdem. und Verwandte Zustände, 1896.

[5] Volkmann's Samml. klin. Vorträge, 1895, No. 123.

myxœdema. But the probability is that we shall learn to recognize affections which lie between myxœdema and health, as well as peculiarities of development and disorders of nutrition for which the thyroid is more or less responsible; but the attempt to do this meets at once with the difficulty that in these cases a new equilibrium seems to have been established so that the effects of the thyroid disease are no longer obvious, sometimes, perhaps, no longer felt.

The recent experiments of Halsted[1] have shown that bitches whose thyroids had been partially removed may remain, under ordinary circumstances, in apparently good health, and yet give birth to young that are incapable of sustaining life and have thyroids hypertrophied to ten or twenty times the normal size; and Kocher believes that goitre and cretinism are often inherited, in infected districts, from parents who have no obvious disease of the thyroid, but whose thyroidal functions have suffered some kind of impairment.

The very fact that large portions of the thyroid can be removed without exciting myxœdema inclines one to believe that morbid results occur which we do not yet know how to recognize, for otherwise we should have to assume that its previous bulk was unnecessary, and this in face of the observation (Halsted) that even when the tip of the gland is experimentally injured the whole organ undergoes changes of "hypertrophic" character, leading apparently to an increase of its secreting structure.

It is still a question whether the concurrence of thyroid disease with various dystrophies not characterized by the typical symptoms of cachexia thyreopriva, as in the interesting cases of subcutaneous fat, hypertrophy, etc., reported by Dercum and Henry,[2] or with the obesity of hogs (Lenz, *Deutsche med. Woch.*, 1895, p. 597), or in cases of infantilism, indicates a relationship which is in some degree causal.

Again, it has been suggested by Horsley[3] and by Gley and Ballet,[4] that we may sometimes find symptoms due to excess or alteration of the thyroid secretion side by side with symptoms of deficiency.

In this way, Horsley thinks, we may best account for the occurrence of dyspnœa (which is so often seen in the case of animals whose thyroids have been removed) in conjunction with the symptoms of Graves's disease.

But if it is entirely conceivable that disorders of nutrition of one or another sort, besides myxœdema, are sometimes due to deficiency of thyroidal secretion, or irritative nervous symptoms hitherto unexplained, to its excess or alteration, it is obvious that we have as yet no suffi-

[1] An Experimental Study of the Thyroids of Dogs, etc. Johns Hopkins Hospital Reports, i.
[2] American Journal of the Medical Sciences, November, 1892. Ewald, in his monograph (loc. cit.) says that he has seen a similar case.
[3] British Medical Journal, 1896.
[4] Semaine Méd., 1895, p. 330.

ciently good touchstone to enable us to determine the question in a given case. All that we can do is to define so far as possible the directions in which research may safely tend.

Can we use the success or failure of treatment by thyroid preparations as an indication that a given disease is or is not of thyroid origin?

The usual assumption seems to be that the success of such treatment, as occasionally in skin diseases, is not a reason for referring the symptoms to this cause. This is probably correct, but we have not an equal right to deny the thyroid origin, or partial origin, of all affections which are not favorably influenced by treatment of this sort. This argument of failure to respond to treatment has been used as against the view that endemic cretinism is a thyroid affection, and yet there are few persons who now deny that tabes is in some sense due to syphilis merely because it is not curable by mercury. Each case must be decided on its merits, after taking all the circumstances into consideration, and the arguments from the effects of treatment are not conclusive in either sense. A good deal of doubt is felt by some competent authorities as to whether endemic cretinism should be classed as a thyroid disease, and I wish to consider some of the arguments on either side of the question, even though it is impossible to reach a definite conclusion, because they open up some new points of view which are important in this connection.

The question has, moreover, a special interest for us, since our countryman, Munson, has shown that goitre, with which in Europe cretinism is closely associated, is endemic among the Indians of the West, especially those living in Montana and Wyoming, on the western slopes of the Rocky Mountains. The writer, an army surgeon stationed at Fort Assinaboine, Montana, has collected reports from among the government physicians at the Indian agencies, covering an Indian population of 147,873 persons. The proportion of goitrous persons reached in some tribes 4.2 per cent. The same mystery shrouds the origin of the disease here as in the mountainous areas of middle Europe. It is obvious that locality is the important factor, but, as Munson shows, the whites in the same locality and drinking the same water are not affected in the same way. They are also less degraded and intermarry less often.

The mineral composition of the drinking-water is given in the paper, but the geological data have not yet been worked out enough to justify a comparison with the conditions existing in Europe.

Cretinism seems to occur but rarely among the Indians; in fact, only one case has been reported.[1] Closer investigations may show this opinion to be erroneous, or may explain the cause of the difference between the conditions existing here and those in Switzerland.

The writer concludes that the factor of main importance is that of

[1] New York Medical Journal, 1895, ii. p. 513.

race; but, in view of what the European observations have taught, it seems more likely that this is rather one of the predisposing influences which so strangely complicate the attempt to discover the real cause at work.

A similar predisposition exists in heredity. Munson states that the goitrous Indian children are generally born of goitrous parents; but the tendency must have had a beginning independent of direct inheritance, and so we are forced back to a condition of affairs of which the simplest analogue is perhaps afforded by the experiments of Halsted which have just been referred to.

The topographic localization of endemic goitre was carefully traced by Bircher[1] in 1883, and his results seem to incriminate the drinking-water coming from certain geological formations, not, however, as deriving any particular chemical constituent from those formations themselves, but as probably taking up some organic substance, the nature of which is wholly unknown. Kocher's observations[2] do not wholly bear out Bircher's view that the strata from which the dangerous waters come are so limited in kind, and the matter is still *sub judice*.

The consensus of opinion among the best trained observers is, thus, that endemic goitre is caused by an organic poison, but it is still entirely uncertain whether this acts primarily upon the parenchyma of the thyroid or primarily upon the tissues of other organs. In the latter case, and sometimes even in the former, the disease of the thyroid may be conceived of as resulting from an ineffective effort at neutralization of a tissue poison, or some analogous form of action which, for lack of a more definite term, we express in that way.

The opinion of Kocher, formed after many years of observation,[3] that endemic cretinism is of thyroidal origin, and is due to an hereditary influence, even though the parents were free from obvious goitre, is in harmony with this view.

The principal current beliefs as to the nature of endemic cretinism are three. The first assumes that it is essentially identical with infantile myxœdema, and due, like that, to disease of the thyroid—though only partial disease, since complete removal of the (goitrous) thyroid from a cretin brings on myxœdema.[4] This view is held by able observers, including Kocher. The second assumes that cretinism is inde-

[1] Der endemische Kropf. u. seine Beziehungen zur Taubstummheit und zum Cretinismus. Basel, 1883. (See the careful summary given by Ewald, loc. cit.).

[2] Vorkommen u. Verbreitung des Kropfes in der Canton Bern, 1889. (See also a letter in the Boston Medical and Surgical Journal, June 24, 1897.

[3] Loc. cit.

[4] An important study of the thyroid (and hypophysis) of cretins, by De Coulon (Virch. Arch., Bd. 147, S. 58) has come to my notice since this paper was first prepared. He found evidences of thyroid degeneration, primary or secondary, in all of his cases, including one of special interest, where the bodily signs of cretinism had been present without the usual mental deficiency.

pendent of thyroidal disease, but is due to the same unknown cause with that which induces endemic goitre. This was the opinion of Virchow, though advanced at a time when the nature of the thyroid functions was unknown, but it has been strongly maintained of late by Bircher on the basis of his great experience. The third view is that of Buschan,[1] who considers that endemic cretinism represents a mixture of myxœdematous cachexia with "degeneracy," due to in-breeding and debased conditions of life.

In the same sense, Bourneville has pointed out that various forms of idiocy may be united with the thyroid cachexia without being in any way related to it.

The arguments bearing on the first two of these views are fairly presented by Ewald, in his monograph.[2] He does not commit himself positively to either of them, but believes that true cretinism is probably dependent in part upon thyroid disease, while admitting that the shape and mode of ossification of the cranium, the peculiarities of growth of the skeleton, the character of the mental deficiency, the frequent association with deaf-mutism, the relatively slight capacity for improvement under thyroid treatment, and other indications, not to speak of the (usual) presence of goitre, militate for the conclusion that this affection deserves to be classified by itself.

The "degeneracy" view of Buschan is reasonable, except that it does not say much that is definite. "Degeneracy" is a broad and vague term. What is it and how shall it be classified biologically? and under what other circumstances of in-breeding do we meet this particular form of it? Such are the questions which press for an answer.

If a comparison be drawn between the effects of removal of the thyroid and those of removal of the generative apparatus, it will appear at first sight that in the former case we have to do with a deep-seated disorder of general nutrition, in the latter, with a specific change in the tendencies of growth. But on a closer view it is, I think, apparent that the differences in either sense are only of degrees, not of kind. There are "positive" characters in cretinism and myxœdema which one is liable to lose sight of if he looks at these affections simply as examples of degradation or poisoning, and, conversely, the changes induced by castration, and still more the conditions which arise in connection with defects in the tendencies of development of which the generative function is the centre, bear, in some respects, the aspect of disease.

When any organ of the body is removed two forces are set at work. One of these is the toxic action of various substances, probably not one, but many, while the other is the influence attending the effort of the organism to establish a satisfactory readjustment on a new basis. The

[1] Loc. cit. [2] Loc. cit.

former of these forces is, in name at least, familiar; it is the latter force that demands closer attention than it has generally received. In the case of pronounced myxœdema the progressive impairment of vitality due to the cachexia overshadows the other tendencies at work, but we shall be more ready to admit that such tendencies may be present after glancing at the kindred results which follow the loss of the generative organs, for these organs represent functions which are likewise of fundamental importance for general nutrition.

In the complex series of changes following castration, such as lead to the formation of the eunuch or the ox,[1] we see these efforts at readjustment culminating in the production, not of a poisoned and stunted individual of the original sort, but of a new individual of a different sort, though not always free from disease. If an analogous process takes place in fœtal life or at impregnation, such that a blow is struck at the developmental tendency of which the sexual function is the centre, we see a still more elaborate set of changes induced, and these may lead to "infantilism," which may, again, be looked on as a successful result up to a certain point, though it is a condition which is liable to become associated with degenerative dystrophies of various kinds.

It is conceivable that the secondary changes due to eunuchism might be cured by following the line of treatment so useful for myxœdema, and giving testicular preparations; and I am surprised that this has never, either in therapeutics or experimentally, been attempted. It would, however, be hard to believe that the same treatment would work satisfactorily in infantilism.

The remarkable series of changes which occur when the thyroid gland atrophies or is removed bear so obviously the stamp of disease that the observer slips only too easily into the habit of designating them as "cachectic" and seeking to refer them to the influence of some special poison.

Perhaps no better single name than cachectic could be found, and, indeed, its use seems abundantly justified by the fact that as a rule these changes lead fatally to a progressive degradation of the vital processes. But this degradation is neither so rapidly fatal nor so inevitably progressive as that, for example, which follows removal of the suprarenal capsules or the pancreas, and for certain groups of cases the progression of the cachexia is so slow that we have practically to deal with a stable organism. Such cases are the milder types of myxœdema, especially myxœdema of infantile origin, endemic cretinism, and such dystrophies as may be referred in part to thyroid disease.

The effects of castration and the altered tendencies of growth implied

[1] Especially interesting as a case of general hypertrophy of the skeleton.

by the term "infantilism"[1] are not called "cachectic," but they are certainly due in part to changes in the composition of the blood, and, as in the case of the athyroidal diseases, it is doubtful if any single term could fully indicate their nature. Darwin and Milne-Edwards refer the results of castration to the action of "compensation," the nutritive material set free by the removal of one organ going to increase the available supply of material for other organs. It is probable, however, that the views of these investigators would have been stated differently if they had been familiar with the pathological data now at our command.

The ox, the capon, the eunuch seem, indeed, to have gained in one way as much as they have lost in another—though this could not be positively asserted without studies into their metabolism, made with special reference to the toxicity of the blood and urine, and especially in the early stages of the metamorphosis—but the obesity which so often follows oöphorectomy is perhaps a sign of disease, and the same may be said of the many nervous and mental symptoms which attend castration both in the male and the female.

I have no wish to attempt any new theory to account for the vast series of changes in the "secondary sexual attributes," through which, after castration, the male is modified in the direction of the female, and the female[2] in the direction of the male (or both in the direction of the neuter); but it may be admissible to point out that the influence at work must be in great part humoral in character, and that the chemical character of the secretions must be subject to constant change as the process goes on.

Illustrations of the truth of the former statement are given in the fact that the neutral worker-bee can be made by change of food to develop into the queen—though, according to Milne-Edwards, with diminution of intelligence—and that Hunter found the transplanted spur of the cock-chicken to grow but very slowly on the leg of the hen, while the spur of the hen-chicken transplanted to the cock grew as rapidly as the normal cock's spur.

The warrant for the statement that one could hardly expect to find a constant chemical condition of the blood and other fluids, be they toxic or not, would seem to be given in the fact that the gross structure is progressively changing in so many respects, and parts are being gained or lost which must have definite functions relatively to the rest of the body as organs of excretion or modification of the blood.

[1] This term was, according to Meige, first introduced by Brouardel. It indicates a condition, slight degrees of which are familiar to everyone, which represents a relative arrest of development at the moment of adolescence or younger. The arrest affects primarily the genital sphere, but involves the "secondary sexual qualities" of both mind and body, and leads to peculiarities of the feminine type.

[2] As in birds and other animals, after cessation of ovulation, or after disease of the ovaries, as well as after castration.

The series of changes which represent the primary result of castration must act in their turn as provocative causes of a second series of changes, and these will stand in only an indirect relation to the special chemical substances with which the blood became charged in consequence of the first generative disease or mutilation.

It may be assumed that when, through the administration of thyroid preparations, the process of disentanglement is initiated, as in the treatment of myxœdema, the "poison" which is neutralized is only that which stands at the end of a series and not one which stands behind each and every one of the morbid processes at stake, though how far this suggestion is of practical importance is uncertain.

Our knowledge of the group of affections not directly resulting from castration, but due to a blow struck, further back, at the developmental tendency of which the sexual function is the central point, has been widened within a few years by the observations of Brouardel, Brissaud,[1] and Meige.[2]

The conditions designated by these writers as infantilism and feminism, slight degrees of which are probably very common, are not only of interest in a general way for the discussion of the "internal secretions," as representing the modifications of the "secondary sexual characters" carried to a further point than after castration, but they are of peculiar interest as being conditions which are often associated with thyroid disease.

The removal or atrophy of the thyroid in infancy absolutely checks the development of the genital organs and function, but it also checks and modifies development in so many other respects that the distinctively sexual results are overshadowed.

In the "infantile," however, the effects of thyroidal disease, though they must often be present in greater or less degree,[3] are overshadowed by tendencies of growth of a specialized morphological character.

Infantilism is apt to be associated with other dystrophies and abnormalities, such as dwarfism, gigantism, feminism, muscular dystrophies, and impairment of the special senses.

The subject will be made clearer by a brief account of an interesting case which I have recently had an opportunity to examine through the courtesy of Dr. F. C. Shattuck.

The case is that of a young man, recently a patient under Dr. Shattuck's care in the Massachusetts General Hospital. (See Fig. 1.) He has been blind from birth (with optic nerve atrophy and disseminated choroiditis), and, although seventeen years old, is a dwarf in size, stand-

[1] Leçons de la Salpétrière. [2] L'Anthropologie, 1895, p. 257.

[3] Post-mortem evidence on this point is not abundant, but Meige says that the thyroid is "generally small" in infantilism, and that Brissaud has found it rudimentary in one autopsy.

ing but four feet four and a half inches high, and is infantile in genital development.

The skin is rather dry and coarse, and there are pads of fat above the clavicles, and spots of vascular congestion on the cheeks, but the hands are not large and no myxœdematous swelling is evident. The abdomen is protuberant, and lordosis is present. He is knock-kneed. His muscles are not only weak—as they have been since birth—but are

FIG. 1.

FIG. 2.

distinctly dystrophic, and have grown steadily more feeble of late, so that he cannot get up from the floor without the aid of his arms, with which he either braces himself against his own thighs or catches hold of his chair. The calves are dense, but not large. The gait is slow and waddling. His intelligence is good for ordinary matters; but he is timid, emotional, and child-like in temperament.

This case is, however, of more interest than as an example of simple infantilism or infantilism complicated by developmental muscular dystrophy and disease of the eyes and by diminutive stature and marks of feminism. I, fortunately, had the opportunity to study the cases of the boy's mother and sister, and found in them additional signs of interest from the thyroidal stand-point, in that both of them had goitres of small size, while the sister, like the brother, was almost blind, and also had disseminated choroiditis; and, although an intelligent girl and suffi-

ciently well grown in height, and of considerable beauty of face, had reached almost fifteen years without ever having menstruated, and showed at least one other stigma of degeneration in that she had but two upper incisor teeth. She presented also some nervous symptoms, such as general excitability and a tendency to dizziness and faintness and frontal headaches, and had a somewhat rapid pulse (90 to 96) on the occasion of my two examinations, and a temperature of 99° F.

The mother of these children could give no history of earlier cases of either goitres or myxœdema, but the important fact was developed that the parents were cousins of the first degree.

The natural comment would be that these are examples of "degeneration" due to in-breeding; but does the much-abused term "degeneration" convey a satisfactory explanation? We know, through the researches of Meige and others, that in infantilism the thyroid as well as the sexual apparatus is usually small, and that infantilism is apt to associate itself with others of these strange disorders of growth—with cretinism and infantile myxœdema—affections due in large part to thyroid disease—and, as has been said, with various progressive degenerative atrophies of developmental character. This is, of course, degeneration, but it is degeneration of a specific sort, in the production of which changes in the internal secretions perhaps play a prominent part.

It is still a question how far in the direction of what is ordinarily called "health" we ought to extend our conception of the thyroidal cachexia; whether, for example, it is probable that some of the changes ordinarily attributed to old age, and, on the other hand, the various slight defects in tendencies of growth in children, or of nutritive weaknesses in adults, such as those showing themselves on the parts of mothers in impaired reproductive powers, or failure to provide properly for the growth of the fœtus, are due to lack of thyroid secretion.

I have dwelt at this length on the subject of infantilism in order to emphasize the view that a close relationship may exist between altered conditions of metabolism due to a specific change in the composition of the blood, such as follows castration or thyroidectomy performed after birth, and complex disorders of the developmental tendencies, in the midst of which the specific alteration of the blood appears only as one feature of the process. It is legitimate to look for corresponding analogies and relationships among the diseases centring around the thyroid, and perhaps we may find in this way an explanation of endemic cretinism.

Again, the tendency shown by infantilism to associate itself with degenerative disorders not obviously definable as diseases of secondary sexual attributes is possibly analogous to the tendency which unites certain dystrophies, like obesity, with affections of the thyroid.

As regards the failure of nutrition in old age, Ewald expresses the

opinion that it is due not to atrophy of the thyroid, but to impairment of the intestinal absorption; but we have no sufficient data for deciding as to the relationship of obesity, tetany, scleroderma, and rickets to thyroid atrophy, except the inadequate argument from the success or failure of treatment.

This subject of obesity in its relation to thyroid treatment was discussed at the Congress of German physicians at Wiesbaden last year, and Spitzer there pointed out that a sharp distinction should be made between the obesity due to food and mode of life and that due to lack of metabolic activity on the part of the tissues. Theoretically, it would only be in the latter form that thyroid preparations, which are a powerful stimulant to proteid metabolism, ought to be of special service. Ewald, however, in his recent monograph on the thyroid disease,[1] says that in practice he has not found this distinction tenable.

If this argument from the effects of treatment is not considered decisive as against the thyroidal origin of a given disease, then the very interesting cases reported by Dercum and Henry ought to be recalled in this connection. Here a peculiar form of subcutaneous dystrophy with accumulation of fat was present, and in two instances the thyroid was demonstrated to be calcareous. Ewald reports that he has seen another case of similar sort to these. I would again suggest that the relationship of obesity, etc., to the thyroidal cachexia may be similar to that of progressive muscular dystrophy to infantilism. In a similar sense the various forms of idiocy which, as Bourneville says, are conjoined with the thyroidal cachexia without being of thyroidal origin, may perhaps be in a sense related to it.

It is a noteworthy fact that the true cretin is not helped by treatment with thyroid preparations to anything like the extent that the so-called sporadic cretin or myxœdematous child is. This shows, either that the cause of his disease lies further back than the loss of his thyroid, both the goitre and the cretinism resulting perhaps from the same influence, or else that the condition is a complex one and only partly of thyroid origin; but it does not show that thyroid disease has or had nothing to do with his symptoms, any more than the failure of an attempt to cure tabes by mercury shows that that disease is not of syphilitic origin.

The only clinical data which have as yet thrown light upon the functions of the pituitary body are those which have been gathered in the study of acromegaly.

It is beyond a question, as a glance at the accompanying charts will show,[2] that a close connection exists between disease of the pituitary body and the symptoms of this affection, and a moderately close connec-

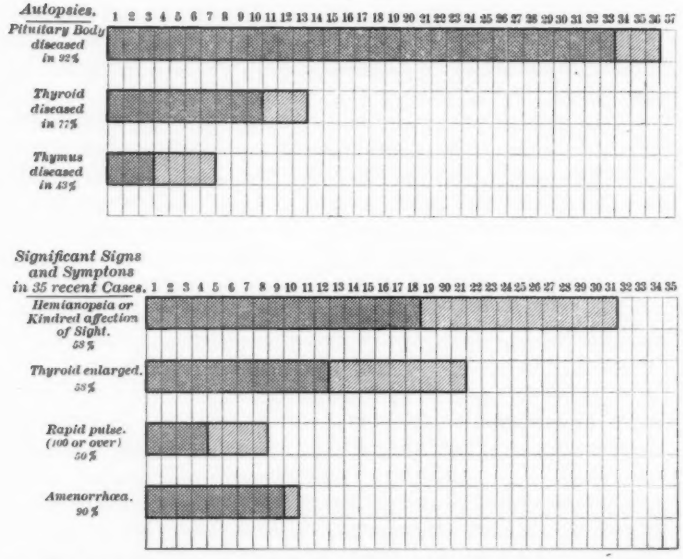
[1] Nothnagel's Specielle Path. u. Therapie. Loc. cit.

[2] Based on reports collected for me with great care by Dr. Franklin W. White.

tion between acromegaly and thyroid disease; but as to the nature of these associations, neither physiological experiment nor pathological research has as yet enlightened us. The character of the pituitary disease varies greatly, but the fact that the organ is commonly enlarged is shown by the frequency with which hemianopia, presumably from compression of the optic nerves, is present during life. (Fig. 2.)

What is the relationship of acromegaly to gigantism? May that also be of similar character with that between eunuchism and infantilism?

FIG. 2


Autopsies.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
Pituitary Body diseased in 92%
Thyroid diseased in 77%
Thymus diseased in 43%
Significant Signs and Symptons in 35 recent Cases.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
Hemianopsia or Kindred affection of Sight. 58%
Thyroid enlarged. 58%
Rapid pulse. (100 or over) 50%
Amenorrhœa. 90%

The black portion represents the number of cases in which lesion was found; the lighter shaded portion represents the number of cases in which the organ is stated to have been normal. In the other cases no statement was made as to the organs. The line at the top gives the number of cases. The percentages are given in round numbers.

Marie,[1] the author of our first carefully drawn descriptions of these affections, thinks that there is nothing in common between them, and that the frequency with which the two conditions are associated is due solely to the fact that the acromegalic tendency occurs during the period of growth; it causes increase in height, suggesting gigantism; whereas, if it occurs in adult life, the hypertrophic tendency is expended on the extremities of the long bones. Sternberg[2] believes that gigantism,

[1] Soc. méd. des Hôpitaux de Paris, 1896, third series, xii. p. 443.
[2] Zeitschrift für klin med., 1895, xxvii. p. 86.

although not a disease, is a condition which, like infantilism, readily associates itself with all sorts of dystrophies—a view identical with that expressed by Meige[1] with regard to infantilism—and that chief among these dystrophies is acromegaly, which is a disease.

It seems to me, however, that when it comes to drawing sharp distinctions between "disease" and "abnormality such as readily associates itself with disease," the task is a hard one, and that the evidence brought forward by Dana,[2] Brissaud,[3] Massalongo, Walker,[4] Hutchinson,[5] Schwoner,[6] and by Sternberg himself, showing the frequency with which acromegaly and gigantism, or unusual development in point of size, are associated, and associated even (Schwoner) in a hereditary sense, is too impressive to be made light of. Sternberg says that of 130 cases of acromegaly, about 23 per cent. show giant growth; and that of thirty-four giants about 40 per cent. appear to have had acromegaly. The only case of acromegaly which I have seen affected a woman decidedly above the usual size.

I have not thought it necessary for the purpose of this discussion to enter at length on the question of the disease of the pituitary body, or the thyroid, in relation to acromegaly, and will say, in brief, that thirty-seven post-mortems have been reported in cases of acromegaly, and that with three exceptions disease of the pituitary body was present in all. In the large majority of cases where the thyroid has been mentioned it was found diseased (ten out of thirteen). The affection is at any rate due to a deep-seated disorder of nutrition in which these organs are immediately concerned.

If one casts a glance over this whole range of diseases that we have been hurriedly considering—eunuchism, infantilism, acromegaly, gigantism, cretinism, infantile and adult myxœdema—and considers what sorts of departures from normal states they represent, the suspicion becomes grounded that they can be brought into some sort of harmony with each other. These affections are all substantially toxic in origin and all in great part due to the loss or disease of an important organ—the testicle, the pituitary body,[7] the thyroid and kindred glands—or else join hands with the loss of the special organ as being both expressions of a developmental defect lying further back.

But the point is that in either case the symptoms and anatomical

[1] For a careful examination of the recent literature of acromegaly I am indebted to Dr Franklin W. White.

[2] New York Journal of Nervous and Mental Diseases, 1893, xx.

[3] Soc. Méd. des Hôp. de Paris, 1896, xii. p. 443.

[4] Journal of the American Medical Association, 1897, xxviii.

[5] Medical News, January 16, 1897.

[6] Zeitschrift f. klin. Med., 1897, xxx. p. 202.

[7] This statement must be modified as regards gigantism, since there is no evidence at present that this is associated with disease of the pituitary body.

changes are not to be looked upon as fortuitous combinations of morbid signs whose only bond is that they are all due equally to a common poison; nor is the term poison an adequate one to describe the agency that is at work.

What we see is—more or less vaguely, to be sure—that under the conditions stated a new "set," as it were, is given to the developmental forces of the individual. The eunuch and the ox, the infantile or feminine man, the giant, the cretin, are not simply stunted and poisoned specimens of life; they represent attempts at reorganization on new lines. In myxœdema and kindred diseases this principle is less evidently at work, and the signs of the action of a poison seem more evident; but it may, nevertheless, be profitable to study them on these same lines.

The next subject for consideration is that of the etiology of Graves's disease, which is associated with a thyroid affection of another sort.

What is the part played by the thyroid secretion in producing Graves's disease? This is still a burning question among neurologists, and one of both theoretical and practical interest. It would be desirable to approach the solution by trying to answer the following questions:

1. How shall we define Graves's disease, and is there but one affection that deserves this name, or are there various forms differing in symptomatology, etiology, and prognosis?

2. Is the Graves's complex due purely and simply to thyroid poisoning, so that liability to the disease means only liability to disease of the thyroid, or is there a susceptibility due to peculiarity of the nervous system, and are there cases where this is the controlling factor? In other words, can Graves's disease occur without a thyroid, and if not, can an analogous disorder exist on these terms, and what are its peculiarities?

3. Assuming that the thyroid secretion is the cause of the symptoms as we see them, can we, nevertheless, show that the thyroid disease is often secondary to events taking place in the nervous system?

4. Still assuming that the thyroid secretion excites nervous symptoms, does it do so in proportion to its amount, or is it possible, on the other hand, or even probable, that there is no direct proportion between the amount of excess of the secretion and the severity of the symptoms, so that a small gland is as likely to be associated with marked symptoms as a large gland?

5. To what extent is it possible to localize the lesions of the nervous system associated with Graves's disease?

6. What is the value of the arguments as to the nature of the disease drawn from the effects of surgical or other therapeutical measures?

7. Is there any good reason to suppose that there is a special thyroid

poison which is necessary for the production of Graves's disease, and which does not exist in the normal gland?

I shall try to answer some of these questions, and shall offer, as in my opinion the most profitable point of view from which to study the subject, the suggestion that Graves's disease is the distorted representation of a physiological or quasi-physiological mechanism, and that just as emotional states and nervous states in general are intimately associated with more or less specific changes in general metabolism, so a similar association exists here, but that it has become dislocated and perverted in such a way that toxic symptoms result.

As regards the purely clinical evidence as to the nature of Graves's disease, every one must appreciate the force of the arguments which refer the symptoms to a poisoning with the thyroid secretions, and which make it appear that the thyroid disease is a primary lesion. This view is held by some of the best observers in every country, among whom is Horsley, whose name has been identified with the best work on the thyroid for so many years.

The general nature of these arguments is familiar to every one. The thyroid is almost always enlarged in Graves's disease, and where it has not been found enlarged during life, histological changes have been discovered post mortem.

These changes are almost always what is called hypertrophic—that is, they are such as to secure a larger secreting surface—and, although the secretion is usually deficient in colloid, it is nevertheless functionally efficient, as is shown by the fact that myxœdema does not occur, and that preparations made from the gland of a patient with Graves's disease had much the same effect as those made from normal sheep's gland (Hutchinson).[1]

The symptoms of Graves's disease are almost certainly due, in part, to some poison, and experiments with thyroid preparations, both upon men and animals, indicate that the thyroid secretion is capable of producing analogous symptons to those found in Graves's disease. It is also pointed out that the symptoms of Graves's disease are, in some respects, the converse of those seen in myxœdema; in other respects, similar to them.

On the other hand, it cannot be said that the thyroidal theory is in all respects satisfactory, and, hitherto, it has failed to command anything like a universal approbation.

The symptom-complex of Graves's disease is far richer and at the same time far more varied than that producible by thyroid preparations. The reasons for assuming an excess of secretion are by no means always sufficient, the more so that a partial atrophy of the gland, sufficient to excite myxœdematous symptoms, is no necessary bar to the per-

[1] Brit. Med. Journ., 1896.

sistence of some of the symptoms of the Graves's complex. To meet these difficulties it has been suggested that the thyroid secretion is not necessarily increased in quantity, but may be altered in character. This is possible, but of the fact of such alterations we have no knowledge, and the experiments of Hutchinson,[1] who made preparations from the excised thyroid from a Graves's disease patient, and studied their effects on both men and animals, indicated no difference between this secretion and that of an ordinary gland. Moreover, if we assume that the secretion has specific functions in Graves's disease, then we have no right to apply to it the arguments drawn from studies of the normal secretions. Various other criticisms of the thyroidal theory, and also various other arguments in its favor, could be adduced, but I will refer only to that based upon the effects of surgical treatment by thyroidectomy and those based on the difference in apparent etiology and type between different groups of cases.

Can we infer from the fact that the patient improves more or less after the partial removal of a parenchymatous goitre in Graves's disease—perhaps only a long time after—that the goitre was itself the cause of the symptoms?

I believe that this method of reasoning is mistaken in theory and inconclusive in practice. The question is an interesting one, but I will dwell upon it no longer than to recall that most of us do not believe that because the removal of this or that peripheral irritation makes it easier for a patient to deal with some neurotic tendency, therefore the cause of the neuroses has been discovered. A failure to appreciate this has led to many an erroneous conclusion, as, for example, in regard to the relation between eye-strain and epilepsy or migraine.

If the argument from the success of thyroidectomy is held up as important, then the door is open to many new etiological theories based on similar ground.

For the vicious circle, of which the disease of the gland forms one link and the nervous erethism another, has been successfully broken into by many agencies—electricity, diet, intestinal antiseptics, thymus, and last, but not least, by treatments of the nature of hypnotic suggestion.

In talking of the etiology of Graves's disease, have we a right to assume that the cases to which that name is usually applied are always of one or the same sort?

From the clinical stand-point wide differences are to be seen in respect to etiology, mode of onset, symptomatology, and prognosis.

Who has not seen cases where a person, apparently healthy, has plunged almost at once, in consequence of some terrifying emotion, into a state closely resembling that of Graves's disease, and leading directly to that disease in its most pronounced form?

[1] Ibid.

And, on the other hand, who has not seen similar symptoms, appearing little by little, in patients who had had indolent goitres without symptoms, perhaps for years, or both conditions coming on gradually in connection with chlorosis or in girls of feeble health?

It is the first class of cases that makes it seem almost imperative to regard Graves's disease as a fright-neurosis, while for the cases of the second class the nervous symptoms are often regarded as secondary (Buschan,[1] Marie,[2] and others), and it is pointed out that the eventual nervous symptoms in cases of this sort are rarely so severe or so numerous as in those of the former group.

It must not be forgotten, however, that intermediate cases exist between these two extremes, and that many cases are to be seen of either class which, when fully developed, are indistinguishable from those of the other.

An interesting example of the intermediate forms is afforded by the history of a family of a mother and nine children, from Aveyron, reported by Sottas.

The mother had a goitre associated with dyspnœa and palpitation; a daughter had a goitre without nervous symptoms; a second daughter had dyspnœa without goitre; a third daughter had a typical, serious Graves's disease induced by severe emotion, during which the heart action was powerfully affected; a fourth daughter had Graves's disease, but in a less pronounced form, and also of emotional origin. Four sons and one daughter remained free.

The acute cases are not always of emotional or nervous origin, as is shown by an interesting instance reported by Van Noorden in his recent monograph on chlorosis.[3] In this case the typical Graves's complex sprang into existence, rose to a high point, and again disappeared in the course of a single week, while the patient, a chlorotic young woman, was under observation in the hospital. The thyroid swelled and again shrank, and finally disappeared as the symptoms advanced and receded. Yet no fright or other obvious nervous excitement could be discovered as having preceded this outbreak. It should be said that Van Noorden does not believe that chlorosis is the cause of Graves's disease or that the two affections are especially apt to be associated.

The cases arising under the influence of pregnancy and (perhaps) from intestinal poisons, and without apparent cause, are other sorts which do not fit exactly in either of the first-mentioned categories.

Considering these discrepancies, and remembering that a vastly greater number could be cited, it seems to me idle to expect that we can frame a really satisfactory and comprehensive theory of Graves's disease until

[1] Basedowsche Krankheit Leipzig u. Wien., 1894, and elsewhere.
[2] See Rev. Neurologique, February 15, 1897.
[3] Nothnagel's Specielle Path. und Therapie, Bd. viii.

we learn to penetrate far deeper than is now in our power into the mysteries which shroud the activity of the nervous system and its relationship to thyroid gland and to processes of general metabolism in health.

Every exclusive theory of the present moment is bound to be inadequate, but the consideration of each is likely to be profitable, if it secures us a clearer insight into the physiological and pathological principles that are involved.

One such principle is that the neuroses in general, among which Graves's disease is to a certain extent at least to be classed, owe their characteristics to the fact that they represent distorted and caricatured images of physiological arrangements, separated to a greater or less degree from their natural associations. The mechanism of which they are a caricature was designed to play a subordinate and co-ordinated part in furthering the ends of the economy as a whole, but as seen in disease it is segmented off and enters into independent activity and becomes enlarged and disfigured by forming new associations. By studying the peculiarities of such a neurosis we can often get a side light upon the normal conditions.

The symptoms of Graves's disease shade off, if one studies a large number of cases, into the phenomena of health.

The tremor, the rapid and excitable pulse, the flushed skin, the restlessness of mind, are seen almost habitually in many persons who are called simply nervous, and these symptoms and more, including the staring gaze, may come on suddenly, even in a presumably healthy person, under the influence of strong emotion, which may be called either a disease or a quasi-physiological state. In fact, the Graves's disease complex is but one of the wide range of results to which emotional disorders may lead, each of which must have its definite pathology. Anything which can be ascertained with regard to the physiological and chemical pathology of emotion is likely to throw light on the nature of Graves's disease, and *vice versa*. From this stand-point the toxic theory of Graves's disease becomes of special interest. If it is true, as Moebius —the able defender and essentially the author of the thyroidal theory— suggests, that a sudden fright does not cause Graves's disease except where the thyroid was previously in an unstable condition, then it is equally likely that physical signs of fright, even in those cases where these signs subside more or less quickly, arise more easily when the blood contains certain constituents which render the nervous system more sensitive in this or that special way. Chemical theories of physiological processes seem less foreign to-day than they would have seemed a few years ago, and there is nothing especially unreasonable in the view that emotional states of more or less definite sort are foreshadowed in the metabolism of the individuals who are liable to them, just as habitual thoughts occur most readily the more readily they find the

appropriate expression awaiting them. If it is really the thyroid secretion (or some other product of disordered metabolism) that excites the symptoms of Graves's disease, then it may be that the presence of this secretion in the blood helps to insure the mobility of the nervous system in certain respects in health.

If the thyroid secretion has nothing to do, etiologically, with fright, then there is the more reason to think that the emotional form of Graves's disease is not of thyroid origin, and we may rest content with our old physiological theories as to the cause of the physiological element in fright.

I venture to suggest, at any rate, that if the thyroid secretion is the usual excitant of the Graves's complex it acts like a match applied to a combustible, by giving the final impulse necessary to the outbreak of the disease, rather than by exciting symptoms proportionate to its own amount. This seems to be borne out by the fact that the severity of the symptoms is by no means in the same ratio with the size of the gland, the most violent nervous symptoms sometimes being associated with a very small gland, which cannot even be felt, while the reverse is equally true. Again, the additional administration of thyroid preparations does not by any means necessarily increase the symptoms, as my own experience and that of others has abundantly shown. The degree and nature of the susceptibility seems to be the controlling factor.

If my view is correct, that, under the appropriate conditions as regards susceptibility, a small amount of the thyroid secretion may suffice to precipitate the disease, we can easily understand why this should occasionally happen when myxœdematous symptoms occur.

In the great majority of the reported cases of this sort the myxœdematous symptoms have supervened on those of Graves's disease, and it might be said that the latter had simply lasted over from acquired habit. But occasionally the sequence is reversed, and an interesting case of this sort has been communicated to me by Dr. Osler.

I will only repeat, in conclusion, that the importance of the analogy between Graves's disease and health is urged, not as an exclusive theory, but as one profitable mode of regarding the subject.

A CASE OF LEVANT FEVER.[1]

By A. Alexander Smith, M.D.,
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So far as I have been able to ascertain, this is the first case of Levant fever reported in this country.

Mrs. G., thirty-four years of age; married eleven years; came under my observation on January 13, 1897. She lived in the United States until the autumn of 1885, when she went to Syria.

Family History.—Father and mother are living and in good health. Brothers and sisters—five in all—in good health. No history of hereditary taint in either family of parents.

Previous History.—The patient always enjoyed good health, with the exception of whooping-cough and measles in childhood, until the autumn of 1888, when she was compelled to leave Aleppo, where she had been for six months, on account of recurring attacks of intermittent fever. These attacks began with slight chilliness, the fever following being continued and lasting three or four days. The attacks came regularly once in two weeks. The last attack occurred in July, 1889, while travelling on the Cilician plain from Tarsus to Aintab. It was the most severe of all. During none of these attacks was the blood examined. She had lived, before her marriage, in a malarious region in Southern Iowa, but had never had any malarial manifestations before.

In the autumn of 1889 she removed to Beirut, Syria, where she was apparently perfectly healthy until the autumn of 1895. In the summer of that year she visited America, and became much run down while staying with her parents in Southern Iowa. Upon returning to Beirut she had an unusually severe attack of typhoid fever, the fever lasting more than six weeks, and with hemorrhages from the intestine in the fourth and fifth weeks. After recovering from the typhoid fever she regained her usual flesh and strength very rapidly, and was apparently in her usual health until July 4th following. On that evening she sat out rather late at a garden party. That night she began to have fever. It was of a remittent type, and lasted four weeks. There was no diarrhœa, no hemorrhage from the nose or intestine, no eruption, no cough.

Quinine was given in twenty-grain doses in the morning, when the temperature was the lowest, the bowels having been previously cleared out, but with apparently no beneficial effect. At the end of four weeks the fever disappeared for three days, and then began again, but with greater severity, the morning temperature averaging 102.5° F., and the evening temperature 104° F. This second attack lasted also about four weeks. During the whole of the second attack she was kept on milk and Vichy. There was no delirium, no epistaxis, no eruption, and no enlargement of the spleen, and no diarrhœa. After this attack she remained free from fever about three weeks, and then went up to a village on the Ante-Lebanon range, about 6000 feet above sea-level. Here the fever again returned, early in October, 1896, and has been persistent up to the pres-

[1] Read before the Association of American Physicians, Washington, D. C., May 6, 1897.

ent time—January, 1897. In December the fever began to change its character (while on board a steamer leaving Beirut), and there was an intermission each day instead of a remission. She also began to have a slight chill each day (sometimes a severe one), and almost always about the same hour. While in Switzerland, in December, she was given large doses of quinine, as much as ninety grains a day, but without benefit. Twenty grains a day by subcutaneous injection failed to give more than temporary relief. The voyage across the Atlantic, early in January, 1897, gave much benefit, and she has continued to improve daily since her arrival in America. The attack of fever at the present time only lasts a few hours, beginning about 2 P.M. and passing off about 6 P.M.

Since coming to New York she has taken quinine on several occasions on going to bed, and with apparent good results. Her menstruation during all these attacks has been fairly regular. Since October she has had almost constantly severe night-sweats. These were most severe in Montreaux, Switzerland, in December, 1896. They were, at times, so severe that she was obliged to change her clothing as often as three times during the night. During all these attacks she had a fairly good appetite, and seemed to digest her food with but little distress. When put on a pure milk-diet, or milk and Vichy, her fever was not affected, and she lost flesh and strength more rapidly than when on a more liberal diet.

The foregoing history was furnished by the patient's husband, a physician. He has been practising in Beirut, Syria, several years, and states that his wife's case is similar to others he has seen, the disease being known there as "Levant fever."

When I first saw her a careful examination failed to reveal evidence of lesion of any kind anywhere in the body. The patient has been seen repeatedly since that time up to the latter part of April, and has on each occasion shown elevations of temperature at some time in the day, usually in the afternoon up to early evening. The daily variations have differed somewhat. At first they were about 2°, and in the month of February they continued about the same; but in March, for a period of six days, the diurnal variations were 3°. In April a careful record of the temperature was kept for ten days at a time, at two different periods, and the variations were sometimes as much as 4° F. When they were as great as this there would often be a subnormal temperature in the morning. Since the latter part of January she has been able to go about the city, and even make short trips out of town to visit friends. The improvement in her general condition has corresponded with the results of the examinations of the blood during this period, which have shown a continual improvement. The last examination of the blood was made on April 9th, and was as follows:

Red corpuscles	4,600,000 per c.mm.
White corpuscles	9,200 " "
Hæmoglobin	92 per cent.

Examination of the stained specimens showed the same parasite as herein described, but much less frequently. The red corpuscles were

otherwise normal. The leucocytes were apparently normal, and the various forms present in normal relative proportions.

The blood examinations were made by Dr. John S. Billings, Jr., who has had much experience in such work.

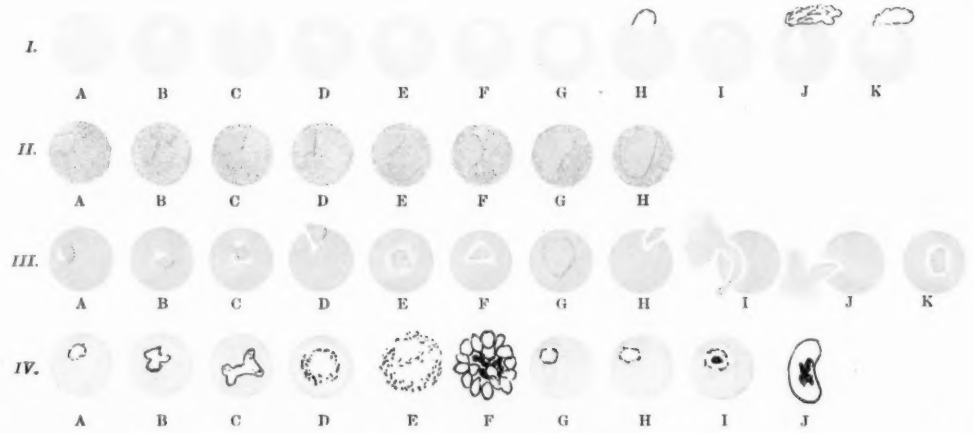
Report on the examination of the blood:

January 14, 1897. Temperature 103.5° F.

Red corpuscles	3,740,000 per c.mm.
Leucocytes	20,200 " "
Hæmoglobin	87 per cent.

Examination of fresh specimens showed the red corpuscles to be fairly normal. No variations from the normal in size or shape were observed. (Poikilocytosis and schizocytosis respectively.) No pallor of centre of corpuscles. A well-marked leucocytosis was present. The corpuscles contained no blood pigment, nor was any observed free in the plasma. The blood plaques were apparently normal. In a large number (about one-tenth) of the red corpuscles there were observed bodies resembling markedly the intracellular hyaline forms of the malarial parasite. Certain differences were observed, however. Fully one-half these organisms or parasites were much larger than the intracellular hyaline forms of the malarial organism, as seen in the tertian and æstivo-autumnal types of that disease. No pigmented forms were observed. The larger forms were central in position, and took up fully one-half or more of the red corpuscle. The smaller forms were amœboid, but never to the degree seen in the malarial organisms. The bizarred cross and chair forms, so common in tertian malarial fever, were never observed, nor the ring-like forms of æstivo-autumnal fever. These smaller forms were, as a rule, eccentric and peripheral. Their power of amœboid movement manifested itself in a slow change of shape from a circle to a square or five- or six-sided figure, and then back again. They move round within the red corpuscle, and in a few cases were seen to force out the cell-wall of the red corpuscle, into a small knob-like projection (*c*). In two cases the organism was seen to have partially escaped from the red corpuscle (*d*). These were probably not artefacts, as the corpuscles around were perfectly normal. The outline of these bodies was much fainter than that of an intracellular hyaline malarial organism. Nothing resembling the process of segmentation was observed, with the exception of one red corpuscle in which four of these organisms were seen, each one being amœboid (*e*). One specimen was ringed with vaseline and kept under the microscope for an hour, but nothing new was seen. No forms larger than two-thirds of the volume of the red corpuscle were seen. Both the forms which were observed in the act of escaping from the red corpuscles were of this size. It is just possible that this is a regular process, or that the corpuscles containing these larger forms remain within the spleen and segment there, as in the case of the organisms of æstivo-autumnal malarial fever.

Examination of dried specimens, hardened and stained by the various methods used in blood examination, showed these organisms to stain similarly to the malarial organism. The best results were obtained by hardening in equal parts of alcohol and ether for an hour, and staining with a dilute solution of gentian violet. No evidence of any nucleus was to be made out, even by using an apochromatic objective and high



I. A to K. The parasite as seen in fresh specimens.
II. A to H. The parasite as seen in specimens stained with Ehrlich-Biondi triple stain.
III. A to K. The parasite as seen in specimens stained with eosin and methylene-blue.
IV. A to F. The parasite of malarial fever of the tertian type as seen in fresh specimens.
IV. G to J. The parasite of malarial fever of the aestivo-autumnal type as seen in fresh specimens.

eye-piece. Nothing further was to be made out in the stained specimens than has been already described under the head of the fresh specimens.

The red corpuscles containing the organisms showed no variations from the normal in staining, but a comparatively moderate number of polychromatophilic red corpuscles were observed, none of which contained the parasite. A differential count of one thousand leucocytes in a specimen stained with the Ehrlich-Biondi triple stain showed the leucocytosis to be due to an increase in the number of polynuclear neutrophilic forms, there being an absolute as well as relative diminution in the number of the small mononuclear forms. The eosinophilous forms were also markedly diminished in number, as we would expect to find in a case of fever of such long duration as the present one.

Polynuclears, 91.4 per cent.; large mononuclears, 5.3 per cent.; small mononuclears, 3.2 per cent.; eosinophiles, 0.1 per cent.

No abnormal forms of leucocytes or red corpuscles were observed. (Myelocytes or nucleated red corpuscles, respectively.)

No new forms of the organism nor any morphological characters not already described were observed in any of the subsequent examinations. A culture on blood serum from the blood showed no growth of any kind.

15th, 8.30 P.M. Temperature 100.2° F.

Examination showed the organisms were much fewer in number, the proportion being about one-half as many as were seen on the previous day.

17th, 12 M. Temperature 101° F.

The organisms in the blood were almost as numerous as on the 14th.

19th, 4 P.M. Temperature 102° F.

Result of the examination as on January 14th.

24th, 9 A.M. Temperature 98.5° F.

Very few parasites were observed in the blood, and all those seen were of the smaller variety.

27th, 12 M. Temperature 101° F.

Red corpuscles	4,240,000 per c.mm.
Leucocytes	12,800 " "
Hæmoglobin	93 per cent.

Examination showed the parasites to be distinctly less numerous than they were at the same hour on January 17th—ten days previously. This coincided with the distinct improvement of the patient during that time. The range of the fever had been lower, and she was distinctly less anæmic, as shown by the increase of 500,000 per c.mm. in red corpuscles, and of 6 per cent. in the hæmoglobin. A differential count of the leucocytes showed that the number of the various forms had returned almost to their normal relative proportions.

Polynuclears, 81.4 per cent.; large mononuclears, 3.6 per cent.; small mononuclears, 14.8 per cent.; eosinophiles, 0.2 per cent.

The number of the eosinophiles still remains diminished, however.

February 5th, 2 P.M. Temperature 100.1° F.

Since February 1st the patient has been taking ten grains of sulphate of quinine—fifty-five grains in all. The number of organisms was fewer than at the same hour on other days, one being seen in about every two fields of the microscope.

We have here in the blood a parasite resembling somewhat the youngest forms of the organisms seen in the two types of malarial fever prevailing in this country. It differs from them in certain important particulars. It is found in the blood in the largest numbers during the height of the febrile paroxysm. In malarial fever the young intracellular hyaline forms of organism are not abundant until some hours after the height of the febrile paroxysm—*i. e.*, until sufficient time has elapsed after segmentation for the young parasites to penetrate the red blood-corpuscles. The time-cycle is shorter with this parasite than in the forms of malarial fever prevalent in this country. In the fevers of the tertian and double tertian (quotidian) type the time-cycle (*i. e.*, the time it takes the organism to go through all the stages of its development and begin anew) is about forty-eight hours. In æstivo-autumnal fever the time-cycle is about thirty-six hours, and in quartan fever about seventy-two hours. This parasite is resistant to quinine, while the younger forms of the malarial organism are very susceptible to it. Other differences are the larger size of this parasite, its freedom from pigment, its comparatively feeble power of amœboid movement, absence of segmentation, fainter outline, and absence of the characteristic forms of the malarial organism as we know it in this country. (Bizarre forms, ring-like forms, crescents, etc.) The case could only have been confused with one of the æstivo-autumnal or fall type of malarial fever, as a case of tertian malaria would have shown the larger pigmented forms of the organism, and a case of æstivo-autumnal malarial fever of such long duration would, in all probability, show the so-called crescentic bodies.

Characteristics.—In this case there was a period of fever lasting four weeks and followed by an interval of three days of freedom from fever. Then there was a second run of fever, more severe than the first, and lasting four weeks, the morning temperature being 102.5° F., and the evening temperature 104° F. This was followed by freedom from fever for three weeks, and then a recurrence, beginning October 1, 1896, and lasting persistently until January, 1897—indeed, until the latter part of April, 1897, the time when the patient was last observed. At first the fever was of a remittent type; later it changed to intermittent. It seems to have been resistant to quinine. No pigment was found in the blood plasma nor in the corpuscles. It should be stated, however, that no blood was taken from the spleen for examination. It was thought wise not to puncture the spleen, as the latter was not enlarged. There was no marked degeneration of the blood-corpuscles. The attack has now lasted more than ten months. Since the patient's arrival in New York, although she has had fever to a greater or less extent every day, she has enjoyed a fair degree of health—has, indeed, constantly improved in her general health.

While it must be admitted that the organisms, as shown in the accom-

panying plate, resemble very closely some of the forms of malarial organisms, there are many features about the case which would suggest that it is not malarial in its origin. Observers in the Levant have looked upon this type of fever as malarial, notwithstanding its marked resistance to quinine; but the fact that there is no pigment found in the blood plasma or in the corpuscles; that it is resistant to quinine; that no marked degeneration of corpuscles is produced, such as we see in malarial fevers in this country, and no enlargement of the spleen, would suggest more than a doubt of its being of malarial origin. It will be observed that although she had lived in a malarious region in Southern Iowa up to the time of her marriage, and that various members of her family there had suffered from malarial manifestations, she had never had any such manifestation until she went to Syria to live.

LITERATURE.—A careful search through the literature of the fevers occurring in the Levant, or countries bordering on the Mediterranean Sea, shows the greatest confusion of ideas among the various observers.

Should we judge by the nomenclature, we would say that these countries suffer from a larger variety of fevers than any other part of the world, for besides typhoid, typhus, and malarial fevers, which are all prevalent in those countries, mention is made of Malta, Neapolitan, Levant, Gibraltar, Rock, and Mediterranean fevers. No two articles on the same fever agree, for, where one man may be describing typhus fever, another may be describing malarial fever; and the same name is often used for different diseases. For instance, the attending physician of the case here reported stated that he has seen several such cases, and that it is known as Levant fever; but in the *Index Catalogue* of the Army Medical Library Levant fever is classified under the head of typhus fever. The bubonic plague is also sometimes known as the Levantine disease or plague, thus adding another source of confusion, so that we must be content with such reports as correspond to the case in question. Undoubtedly most of the cases of fever bearing the name of a given locality fall under the head of typhoid, typhus, or malarial fever. But that a fourth variety of continued fever occurs is well shown in the excellent articles of Bruce[1] and Hughes,[2] and it is to this variety of continued fever that the case here reported may probably be ascribed.

The articles of Bruce may be abstracted as follows: He saw at Malta many cases of what he terms "Mediterranean fever," presenting the following characteristics: it is a subacute, infectious, non-contagious disease, characterized clinically by fever, sweats, constipation, and frequent relapses. It is usually accompanied or followed by severe rheumatoid or neuralgic pains, with redness, tenderness, and swelling of the various

[1] Bruce: Annales de l'Inst. Pasteur, 1893, vol. vii. p. 289.
[2] Hughes: Ibid., p. 628. Lancet, London, December 3, 1892.

joints. The spleen is large and soft. As the disease progresses, anæmia develops. The disease prevails during the summer months. The mortality is not high, the death-rate being about 2 per cent. of all cases. There is general malaise, headache, etc., for eight to ten days, when the temperature rises gradually, taking three or four days to reach its maximum, after which it runs a course of a remittent type, falling to 100° F. in the morning hours, and rising to 103° and 104° F. in the afternoons.

The fever generally lasts one month, the temperature gradually falling to normal, where it remains about three days, when the same course of events repeats itself. This is repeated three or four times, the patients being in the hospital for three months or more. The disease may last six months or a year. The fever is but little influenced by quinine or arsenic beyond the temporary antipyretic effect of large doses of the former. The plasmodium of malaria is not present; there are no rose-spots or tympanites; and on post-mortem the Peyer's patches are found to be unaffected. Bruce has found in the spleen a micrococcus (m. melitensis) which he holds to be the cause of the disease. Monkeys injected with cultures of this organism showed a typical rise of temperature and continued fever, lasting some months, and the micrococcus was found in the spleen and internal organs on autopsy.

Hughes confirms these statements of Bruce. He says the disease is characterized by intermittent waves of pyrexia of a remittent type—one to three weeks of fever, and two to three days' interval. In rare cases these remissions are so marked as to take the form of intermissions, with a sharp rise of temperature in the morning and a gradual fall at night. The disease does not confer immunity against a second attack, and several instances of typhoid following it were observed. Hughes also finds the m. melitensis constantly associated with the disease, but does not believe it to be the actual cause.

THE POSSIBILITIES AND LIMITATIONS OF FORMALDEHYDE AS A DISINFECTANT.

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During the past two years the disinfectant properties of formaldehyde gas have been the subject of investigation by a number of experimenters, whose results have been by no means uniform. While all agree as to the undoubted value of the agent as a surface disinfectant, there is a wide variance of opinion as to its power of penetration, some finding it to be slight or even wanting, some reporting it to be considerable, and some, perhaps carried away by enthusiasm, asserting that it

is extraordinary. Some reports betray such a bias in favor of a particular apparatus as to suggest that their authors have lost sight of the fact that the germicidal power rests in the gas itself and not in the particular apparatus or lamp by which it is set free. Consideration of the expense attending its use as a practical disinfectant for general use has led to the invention of a number of lamps designed to bring about the desired results as conveniently and economically as possible, and as the importance of the agent becomes more generally recognized, and brings about a consequent increased demand, it seems probable that at no distant day inevitable business competition and stimulated inventive genius will result in a considerable cheapening of the process of manufacture of the agent and in the production of apparatus for its economical dissemination. At present its use on a large scale is beyond question expensive, no matter what process is employed, and certain of the processes, which have been recommended, are undeniably wasteful of material.

The experiments here recorded were undertaken to determine the possibilities and limitations of formaldehyde without especial consideration of the economical aspect of the question. The especial points were:

1. The efficiency of formaldehyde as a general disinfectant.
2. Its penetrating power.
3. The amount necessary in a given air-space for the destruction of different micro-organisms.
4. Its action on higher organisms.

The experiments were conducted in two of the surgical operating rooms and in the pathological laboratory of the Boston City Hospital, where every facility was afforded me by Prof. William T. Councilman, pathologist to the hospital. I received much valuable assistance from Dr. Richard M. Pearce, first assistant in the laboratory, to whom my grateful acknowledgments are due. The cultures regularly employed were staphylococcus aureus, typhoid, anthrax spores, and a non-pathogenic spore-bearing bacillus; others were occasionally employed, as will be noted. The non-pathogenic spore-bearer has not yet been absolutely identified, and hence will be designated here simply "non-path. spore-bearer." It is a bacillus about as large as anthrax, but with a large oval spore, grows profusely at room temperature and at 37.5°, liquefies blood-serum and gelatin, produces a grayish-yellow growth on agar-agar, a profuse white growth on potato, and slight diffuse clouding of bouillon, produces acid, but no gas, is not motile, and is not always killed by fractional sterilization for forty-five minutes on three successive days. It is non-pathogenic for rabbits and guinea-pigs.

All cultures used, excepting those of the spore-bearers, were from twenty-four to forty-eight hours old, and were made on blood-serum or bouillon; those of the spore-bearers were from four to ten days old. All

tests were made on blood-serum or bouillon, and all reported as negative were so at the end of seventy-two hours.

The first experiment was made in a room 26.75 feet long, 19.75 wide, and 14.50 high, thus having a capacity of 7660.5 cubic feet. The single door is in a corner away from the windows, which are three in number and all on one side. Along that side runs a work-table provided with drawers. On the side opposite, about in the middle, is a hood with a good ventilating flue, and in the hood stands a thermostat. In either transverse half of the room, well away from the walls, stands a desk eight feet long, five feet wide, and three feet eight inches high, provided with drawers and lockers with shelves. That nearest the door will be designated "Desk A;" the other, "Desk B." The spaces between the windows are equipped with shelves, the three upper and lowest of which in each place are 1 foot 4 inches, 2 feet 9 inches, 4 feet 2 inches, and 9 feet 9 inches, respectively, from the ceiling. The outlets for ventilation other than the one in the hood are two in number and in the same wall. All three were closed during the experiment, but only by means of the registers, which are by no means air-tight.

The tests employed were as follows:

On Desk A: 250 c.c. typhoid infected milk in a quart pitcher; biscuit smeared with typhoid (bouillon culture) and tied up in a napkin; anthrax spores inside a small pear; smears of anthrax spores, typhoid, and non-path. spore-bearer on paper (exposed); same and one of diphtheria (throat culture) in thin blank-books; smear of staphylococcus aureus inside thin blank-book near binding (book tightly closed); two rabbits in a wire cage, one with anthrax spores, the other with non-path. spore-bearer smeared on the head.

On Desk B: Typhoid infected sheet and blanket tied up in a clean sheet; typhoid stool in a basin covered with a towel; two dressings (twenty-four hours old) from an empyema; dressing (seventeen hours old) from an abdominal wound; dressing from fecal fistula (corrosive and iodol; on three hours); one uncovered and five covered Petri dishes containing water with an abundance of water bacteria; two uncovered Petri dishes containing pond water and sour milk in thin layers; racks containing cotton-stoppered test-tubes of bouillon and cultures of typhoid, diphtheria, staphylococcus albus and aureus, and non-path. spore-bearer.

In thermostat: Cotton-stoppered tubes of diphtheria and anthrax spores and exposed smears of the same on paper.

In covered galvanized iron barrel eight feet to the side of door: Lot of surgical dressings, including one from a septic compound fracture of the tibia, wrapped in paper and cotton.

In order to have other than bacteriological tests of the diffusion of the gas, thirty-three Erlenmeyer flasks containing decolorized fuchsin

solution and stoppered with cotton were placed in various parts of the room, as follows: On each of the three upper shelves of each tier, at the top of the lower sash of each window, in and on an air-bath fixed to the end wall, in two slop-jars under the desks at the windows, in two closed cupboards under desk B, in five closed drawers in desk B, on desk B next to the typhoid stool, on top and at the side of the rabbit cage, next to pitcher and pear on desk A, in a slop-jar under the sink next to the hood, on the upper and lower shelves over the same, in and on the thermostat, in an open tin box next to the hood and six feet from the floor, in the barrel, and in the lower drawer of the end desk by the windows. A control flask was placed in another room. This solution, which is made by passing a stream of sulphurous acid gas through a dilute solution of fuchsin (1 : 1000) until the color is discharged, I had found to be extremely sensitive to the presence of formaldehyde gas in the air even when contained in flasks plugged with cotton as in bacteriological work. A very small trace of formaldehyde in the air is sufficient to more or less completely restore the original color.

The room was closed, the crack under the door stopped with wet cotton, and the gas introduced through a fine tube which passed through the keyhole. The apparatus used was the lamp manufactured by the Sanitary Construction Company, in which the so-called formalin (40 per cent. solution) is slowly admitted to a heated spiral tube and vaporized. In the tank of the apparatus, at the beginning of the experiment, was 2400 c.c. formalin. As the lamp worked badly, the gas was given off very slowly, and finally, owing to persistent clogging of the tube, its use was abandoned until the next morning. On measuring the formalin left in the tank, it was found that but 650 c.c. had been consumed. On the following morning, after an interval of fifteen hours, the room was opened and aired. Cultures were taken as follows:

1. Smear of non-path. spore-bearer on desk A.
2. Typhoid feces.
3. Typhoid milk.
4. Diphtheria (closed tube).
5. Typhoid (closed tube).
6. Anthrax spores (closed tube).
7. Non-path. spore-bearer (closed tube).
8. Dust from lower shelf.
9. Diphtheria throat culture in blank-book.
10. Smear of typhoid in blank-book.

Examination of the Erlenmeyer flasks showed slight restoration of color in the contents of those on the six shelves between the windows, in the slop-jar, on the shelves over the sink, in the thermostat, on desk B near typhoid stool, on desk A near the milk-pitcher, in the barrel, over the middle window, and in two of the drawers of desk B. In the

flask on the thermostat in the hood, near the outlet flue, the register of which as stated was closed but not hermetically, the color of the solution had been almost completely restored. The fluid in the other flasks was unchanged in appearance.

The rabbits, which soon after the beginning of the experiment had shown signs of discomfort, appeared to be not much affected, although frequent observation through the transom over the door had led to a different prognosis.

The room was again closed as before, and the lamp, which had been put in order, was again applied, and the experiment resumed. The tank contained 2550 c.c. formalin, and when the apparatus was removed all but 400 c.c. had been consumed. On the following morning, after the same exposure as before, the room was opened and quickly aired. On entering the room, the atmosphere was almost unbearably irritating to the eyes and nose, and one of those who entered suffered several days from a severe coryza thus induced. Contrary to what was to have been expected from the experience of Pfuhl, Aronson, Rosenberg, and others, one of the rabbits was dead, and the other was breathing through the mouth with great difficulty. This one improved noticeably within the next two hours, but died thirty-six hours later.

Examination of the flasks containing decolorized fuchsin solution showed that with one exception the color of the liquid had been more or less completely restored. Those showing the greatest intensity of action were as follows: On the six shelves between the windows, at the tops of the lower sashes, in and on the thermostat, in the tin box next to the hood. In these cases the color was completely restored. Those showing the least action were in the drawers and cupboards; their color was light amethyst. The remaining flasks, wherever placed, showed a color of greater or less depth between these extremes. The one flask showing no change was on desk A, and examination showed that its stopper was much more tightly compressed than any of the others. The control flask was unchanged. Cultures were made from the following:

1. Smear of anthrax spores on desk A.
2. Smear of typhoid spores on desk A.
3. Smear of non-path. spore-bearer on desk A.
4. Smear of diphtheria in blank-book.
5. Smear of typhoid in blank-book.
6. Smear of anthrax spores in blank-book.
7. Smear of non-path. spore-bearer in blank-book.
8. Biscuit (typhoid smear) in napkin.
9. Uncovered Petri dish of water.
10. Uncovered Petri dish of pond water.
11. Uncovered Petri dish of sour milk.
12. Water standing in the sink (shallow).

13. Dust in crack of floor farthest from door.
14. Dust in crack of floor near door.
15. Dust on lowest shelf between windows.
16. Dust in cupboard of desk B.
17. Dust in drawer of desk B.
18. Fluid on bottom of refuse pail.
19. Material on bottom of slop-jar No. 3 (dry).
20. Fecal fistula dressing on desk B.
21. Anthrax spores in hair of rabbit.
22. Non-path. spore-bearer in hair of rabbit.
23. Dried feces of rabbit.
24. Mouth of live rabbit.
25. Nares of dead rabbit.
26. Tongue of dead rabbit.
27. Lung of dead rabbit.

From none of the above was there any growth in seventy-two hours. Cultures from the following showed growth:

1. Dressing from empyema on desk B.
2. Dressing from abdominal wound on desk B.
3. Dressing from septic fracture in barrel.
4. Typhoid sheet and blanket tied in clean sheet.
5. Typhoid feces in basin covered with towel.
6, 7. Closed tubes of anthrax and diphtheria in thermostat.
8, 9. Paper smears of anthrax and diphtheria in thermostat.
10. Typhoid infected milk in pitcher.
11. Pear containing anthrax.
12. Smear of staphylococcus aureus in tightly closed book.
13, 14. Closed typhoid bouillon tubes.
15, 16, 17. Closed tubes of staphylococcus aureus and albus, and diphtheria.
18. Closed tube of typhoid on blood serum.
19. Slop-jar No. 1, containing water.
20. Slop-jar No. 2, dry (non-path. spore-bearer).
21. Galvanized iron barrel (covered).
22, 23, 24, 25, 26. Covered Petri dishes.
27. Dust on top shelf (spores).
28. Nares of live rabbit (spores).
29. Small intestine of rabbit.
30. Large intestine of rabbit.
31. Stomach of rabbit (three colonies of a spore-bearing bacillus).

The cultures taken before the second application of the gas showed good growths, except in the case of the smears of diphtheria and typhoid, which were sterile.

Autopsy of the rabbit which was found dead showed great hyperæmia

and increased moisture of the respiratory passages and congestion of the lungs. The other rabbit was found dead thirty-six hours later. The autopsy showed the same conditions of the respiratory passages and an irregular solidification of about two-thirds of the right lung and about one-half of the left, with increase of fluid in the pleural cavity. Cultures from the solidified portions of the lungs yielded no growth.[1]

The next experiment was conducted in a room 33 feet long, 22.5 wide and 14.5 high, thus having a capacity of 10,766 cubic feet. Three sides of the room contain seven windows, each of which is seven feet wide and ten and a half high. In the fourth side are a single and a double door. Ventilation is provided for by four outlets closed by registers, two of which are 2 feet 2 inches by 1 foot 10 inches, the other two just half as large. Two desks, similar in size to those in the room in which the first experiment was conducted, stand on the floor in similar positions. Experiments on a small scale with flasks and test-tubes having demonstrated that formalin diluted with water can be evaporated by direct application of heat without polymerization, it was determined to try this simple means on a larger scale, with the idea that it would be possible to do away with the use of expensive apparatus.

The test objects used were as follows:

Smears of anthrax spores, diphtheria, and non-path. spore-bearer on paper placed on the desks; smears of anthrax spores and staphylococcus aureus in the desk drawers; closed tubes of diphtheria and anthrax, and open tubes of staphylococcus aureus, anthrax, and non-path. spore-bearer on the desks; surgical dressings wrapped in paper and in cotton on the

[1] Since the above was written the organs of the two rabbits have been further examined. The following description of them is taken from the records of the laboratory.

No. 1. Section of the tongue shows nothing abnormal. Section of mucous membrane of the mouth shows desquamation of the surface epithelium with hemorrhage and infiltration, with lymphoid cells in the tissue beneath. Section of œsophagus is normal. There is no pneumonia. The liver shows marked injection, with granular and fatty degeneration of cells around the central veins of lobules. The lymphatic gland shows some dilatation of the lymph sinuses with hemorrhage. In the kidney there is slight degeneration of the epithelium.

No. 2. In the liver there is considerable dilatation of hepatic veins, with some degeneration of liver cells in the centre of the lobules. The kidney is congested. The epithelium of the convoluted tubules is somewhat swollen and granular, and there is a small amount of coagulated albumin in the capsular space of the glomeruli. In many of the convoluted tubules there is more or less granular and circular reticulum, and, in places, desquamation of the cells. The spleen shows a slight amount of hemorrhage in the pulp. Pancreas shows no change. One of the lymphatic glands shows a marked degree of œdema, with formation of fibrin in the lymph sinuses. In the lung there is intense bronchitis with consolidation extending into the surrounding lung tissue. This is more marked in the very smallest bronchi. In one place, in the centre of a focus, there are numbers of short bacilli. The exudation of the alveoli is almost entirely purulent, with some large cells mixed with pus. In another place in the tissue there were numbers of large bacilli. There is only a slight amount of fibrin in the exudation. In another portion of the lung there were very much larger foci which were filled with organisms. All the bloodvessels of the lung are greatly injected.

It is difficult to explain the absence of bacteria in the cultures made from the lung in the second case. The general character of the lesions in both cases shows the action of a soluble chemical poison on the tissues. The changes are much more marked in the second case than in the first, but in both they are of the same general character.

desks; surgical dressings in a cupboard, and a blanket on which was part of a typhoid stool in another cupboard. A glass dish covered with wire-gauze and containing a number of cockroaches was placed on one of the desks.

4250 c.c. of formalin was mixed with 3000 c.c. of water, and placed in an open copper cylinder of 10 litres capacity, provided with a glass gauge to show the height of the fluid in the cylinder. In order that this might more readily be observed from the transom, the formalin solution was slightly colored with fuchsin. Heat was applied by means of a small gas-stove, the regulation of which was provided for by having a loop of the rubber supply tube passed under the door into the hall. The registers were closed, the gas turned on and ignited, the doors closed, and the spaces beneath stopped with wet cotton. In four hours the gas was shut off, and the room was left unopened seventeen hours. On entering the room, it was evident that considerable natural ventilation had occurred, for the discomfort occasioned was but slight in comparison to that noted in the previous experiment. This result had, however, been foreshadowed by the readings of a wet and dry bulb hygrometer which had been placed near enough to the transom to admit of ready observation. At intervals of a half hour the readings were taken, and in spite of the volume of liquid that had been evaporated, there had been at no time any indication of increase in the degree of moisture in the air. The copper cylinder was found to contain 1200 c.c. of liquid which contained a large amount of polymerized formaldehyde. Of the test-objects employed, only two—the smears of diphtheria and non-path. spore-bearer—were found to have been sterilized.

The next experiment was conducted in a small room of 1500 cubic feet capacity, provided with one window, two doors, and two ventilating openings provided with registers. In this a Schering lamp was employed with pastilles of polymerized formaldehyde. According to Aronson, the proper number of pastilles to be consumed would have been eighty-five, but, as a preliminary test, only twenty were employed, and the results showed that they were quite insufficient. The test-objects employed were smears of typhoid, staphylococcus aureus, anthrax spores, and non-path. spore-bearer on paper, four surgical dressings, and a smear of diplococcus intracellularis meningitidis. After eighteen hours' exposure, all but the last-mentioned showed abundant growths.

The next experiment was conducted in one of the surgical operating-rooms of the hospital, of 4560 cubic feet capacity (19 x 15 x 16). One side of this room is chiefly windows provided with double sashes; on the opposite side is the door, on either side of which is a bandage-closet and a drug-closet provided with glass doors. In the middle of the room is a chandelier provided with reflectors. The Schering lamp was again tried, this time with half the number of pastilles recommended—that

is, with 130. Before the lamp, which was filled with 250 c.c. of alcohol, was lighted, cultures of dust were taken in bouillon as follows:

1. Bandage-closet.
2. Dead fly on window-ledge.
3. Floor near operating-table.
4. Floor near window.
5. Top of marble ledge at window.
6. Crack between water-pipe and floor.
7. Reflector of chandelier.
8. Inlet for heated air under window.

A culture was taken also from a surgical dressing. All gave abundant growths.

Test-objects, consisting of smears of anthrax spores, staphylococcus aureus, typhoid, and non-path. spore-bearer on paper were placed on a table near the centre of the room.

The lamp was lighted, and the door closed. The space under the door was stopped with wet cotton, and the keyhole covered with a gummed label. After twenty-one hours, the room was opened, and, at first, the atmosphere was unbearable. As soon as possible, cultures were taken from the same places as before and from the exposed smears. Dust from the marble ledge and from the bandage-closet, the door of which had been closed, yielded abundant growths, as did also a culture from the dead fly. Dust from the reflector, from the floor near the window, and from the inlet for heated air showed slight growth. Dust from the floor near the wall and under the operating-table, the dressing in a pail, and the paper smears were sterile.

Two Petri plates exposed for twenty minutes after airing the rooms gave the following results:

1. Plate on table at side of room:
   1 colony of a short bacillus.
   1 colony of staphylococcus aureus.
   2 colonies of staphylococcus albus.
   3 colonies of a large yellow coccus.
2. Plate on table in corner of room:
   1 colony of a brown mould.
   1 colony of a short bacillus.
   1 colony of a large yellow coccus.
   1 colony of staphylococcus albus.

The next experiment was conducted in an exactly similar adjoining room with two Schering lamps, each carrying 130 pastilles. It is to be explained in passing that at this time the surgeons were experiencing more or less trouble from pus formation after operations, which was attributed to extensive alterations near by involving the tearing up of some old wood flooring which had been down many years, and causing

much dust. Before the lamps were lighted, three Petri plates were exposed for twenty-five minutes, with the following results:

Plate on sink at side of room:

43 colonies of non-pathogenic organisms.
37 colonies of staphylococcus albus.
4 colonies of staphylococcus aureus.
2 colonies of staphylococcus citreus.

Plate on operating-table at centre of room:

79 colonies of non-pathogenic organisms.
6 colonies of staphylococcus aureus.
39 colonies of staphylococcus albus.

Plate on instrument-table at corner of room:

26 colonies of non-pathogenic organisms.
4 colonies of staphylococcus aureus.
23 colonies of staphylococcus albus.

Before the experiment was begun, dust-cultures, which yielded abundant growths, were taken from the following:

1. Table at side of room.
2. Reflector.
3. Bandage-closet.
4. Floor near window.
5. Floor under operating-table.
6. Crack under water-pipe.
7. Floor at corner of room.
8. Inlet for heated air under window.
9. Marble ledge over sink.

Test-objects were introduced as follows: Smears prepared on papers each of which bore anthrax spores, non-path. spore-bearer, staphylococcus aureus, and typhoid, were encased in small bags made of cotton such as is used in the manufacture of flour-bags. This cotton is very heavily sized, and the bags made from it may readily be filled with water, which then runs through with marked slowness. On being boiled in water, the sizing is removed, and they are then quite pervious. Both forms, boiled and unboiled, were used. After the smears were introduced, the open ends of the bags were twisted and securely tied. Smears in one bag of each kind were placed on a glass shelf at the side of the room, in the inlet for heated air under the window, and on the reflector of the chandelier. Smears of the same four organisms were placed in Erlenmeyer flasks and distributed as follows: Two were placed inside a hair mattress well into the hair, the openings by which they were introduced being then securely closed. One was placed in the bandage-closet, the door of which was closed, and another, plugged with cotton, in the drug-closet, the door of which was left open. In addition to the above, a slightly moist dressing and a wet bloody dress-

ing encased in unboiled bags were placed on a table near the window in company with similar dressings in boiled bags. A rack containing stoppered and open serum-tubes was also left on a table.

The lamps were lighted, and the room closed as before. After twenty hours' exposure the door was opened, and, as soon as practicable, three Petri plates were exposed twenty-five minutes, as before the experiment and in the same situations. On one, two colonies of mould developed; the others were quite free from growths.

Dust-cultures taken from the same places as before were sterile, with the exception of slight growths of moulds, non-pathogenic bacilli, and a few cocci, which were obtained from the floor at the corner of the room and in the closed bandage-closet. The smears in all the boiled and unboiled bags and the slightly moist dressings in both bags were sterile. The wet bloody dressings both showed abundant growths. The smears in flasks in the mattress were both sterile as to typhoid and staphylococcus aureus, but not so as to anthrax spores and the non-path. spore-bearer. The smear in the flask in the closed bandage-closet gave growths of all four organisms, while the one in the plugged flask in the open drug-closet was sterile as to typhoid and staphylococcus aureus. Flasks containing decolorized fuchsin solution, which were placed alongside the test-objects and plugged with cotton, all showed evidence of the chemical action of the gas, excepting the one in the bandage-closet, where nothing was sterilized. The closed serum-tubes, after exposure, were inoculated with diphtheria and staphylococcus aureus and albus, and showed good growths, while the open tubes, similarly planted, showed only slight growths at the level of the water of condensation.

After a lapse of a week, the experiment was repeated in the same room, using the same lamps and the same number of pastilles, but without the introduction of extra test-objects. Dust cultures made from the same places as before showed abundant growths, with the exception of the one from the crack under the water-pipe which gave no results. An additional culture from the drug-closet also gave negative results. After an exposure of similar length of time, cultures were again taken, and all were sterile, excepting that the one from the closed bandage-closet yielded a very slight growth.

During and after the time in which the foregoing experiments were conducted, a series of experiments was carried on in small air-spaces to determine the amount of formaldehyde and the length of exposure required for the sterilization of the various organisms which have been employed, and which may be taken as proper representatives of all pathogenic and non-pathogenic bacteria. Two pieces of apparatus were employed: one, a nearly globular glass bell-jar of 7500 c.c. capacity with an opening at the bottom sufficiently large to admit the

hand, and capable of being hermetically sealed with a greased ground-glass plate, and with two small openings in the sides, one of which served to connect with a test-tube, and the other to be provided with a valve to allow for expansion; the other, a nearly cubical glass case of 201,500 c.c. capacity, provided with a hinged opening at the lower edge of one side two inches in height, and with a small inlet connected, by means of a glass tube and perforated rubber stoppers, with a small glass flask in which the disinfectant could be placed for vaporization by means of a lamp. The results obtained with the small apparatus were in entire agreement with those obtained with the larger, and I will, therefore, not take up space to set them forth. In each experiment the formalin was diluted with a small amount of water in order to insure complete volatilization without polymerization.

Experiments in Glass Cabinet.

Experiment 1.—Test-objects: Smears of diphtheria, typhoid, anthrax spores, non-path. spore-bearer, and staphylococcus aureus; two surgical dressings. Amount of formalin used, 10 c.c. Exposure, four hours. Results: All smears, and cultures from outside layers of dressings, sterile; cultures from inside layers, not sterile.

Experiment 2.—Test-objects: Smears as before. Amount used, 5 c.c. Exposure, four hours. Results, all sterile.

Experiment 3.—Test-objects: Smears as before, excepting diphtheria, and same smears in boiled and unboiled bags. Amount used, 5 c.c. Duration, one, two, three, and four hours for exposed smears, two and four hours for smears in bags. Results: Smears at one, two, three, and four hours, all sterile. Smears in bags at two and four hours, all sterile, except that the smears of anthrax in the boiled and unboiled bags withdrawn at the end of four hours yielded respectively one and three colonies. This last result admits of conjecture, but not of explanation.

Experiment 4.—Test-objects as in Experiment 3. Amount used, 4 c.c. Duration, fifteen and thirty minutes for exposed smears; two and four hours for smears in bags. Results: Smears after fifteen minutes, typhoid and staphylococcus aureus sterile; after thirty minutes, all sterile except non-pathogenic spore-bearer. Smears in bags after two and four hours, all sterile.

Experiment 5.—Test-objects same as in Experiments 3 and 4. Amount used, 3 c.c. Duration: for exposed smears, fifteen, thirty, and forty-five minutes; for smears in bags, one and one-half and two and one-half hours. Results: Smears after fifteen minutes, sterile, excepting non-path. spore-bearer; after thirty and forty-five minutes, all sterile. Smears in bags after one and one-half and two and one-half hours, all sterile. A fly, which, during the airing of the cabinet after Experiment 4, had entered the cabinet, was seen in this experiment to drop dead in fifteen minutes. A culture of the fly taken at the end of the experiment gave negative results.

Experiment 6.—Test-objects as in Experiments 3, 4, and 5. Amount used, 2 c.c. Duration: for exposed smears, fifteen, thirty, forty-five, and sixty minutes; for smears in bags, one, two, and three hours.

Results: Exposed smears, after fifteen minutes, none sterile; after thirty and forty-five minutes, typhoid sterile; after sixty minutes, all sterile except non-path. spore-bearer. Smears in bags: Boiled and unboiled bags at end of one hour, typhoid sterile. Unboiled bag at end of two hours, typhoid sterile; boiled bag, typhoid and staphylococcus aureus sterile.

Boiled and unboiled bags at end of three hours, all sterile except non-path. spore-bearer.

Experiment 7.—Test-objects: Smears on paper (none in bags). Amount used, 1 c.c. Exposure, two and one-half and four and one-half hours. Results: All sterile after both exposures.

Experiment 8.—Test-objects as in Experiment 7. Amount used, ¾ c.c. Exposure, two and one-half and four and one-half hours. Results: All sterile at both exposures. In this experiment, as in Experiment 5, a fly, which had entered the cabinet during the airing process, was found dead, but how long it survived was not noted.

Experiment 9.—This experiment was conducted with the object to determine whether or not it is possible to sterilize surgical dressings and liquid stools by means of any amount of formaldehyde which could be used practically on a large scale. A wet dressing and a liquid typhoid stool in a shallow pan were exposed to an amount of formaldehyde corresponding to one part of liquid formalin vaporized in 5000 volumes of air, that is, to 40 c.c. of formalin vaporized in a little over 200,000 volumes of air. Controls taken beforehand showed abundant growths. After eighteen hours' exposure, the typhoid stool was sterile, as were cultures from the upper layer of the dressing. Cultures from the lower layers of the same yielded abundant growths. At the same time, open and closed serum-tubes were exposed, which, after withdrawal after eighteen hours, were planted with diphtheria and staphylococcus albus. The closed tubes yielded fair growths; the others none.

Conclusions.—Formaldehyde has extraordinary power as a surface disinfectant, greater than that of any other known substance. It is not, however, absolutely thorough in all cases even as a surface disinfectant, as is shown by the results of the experiments in room-disinfection. Ordinary bacteria, and those of the highest resistance as well, when freely exposed to an atmosphere produced by vaporizing approximately 110 c.c. of formalin in each 1000 cubic feet of space, are killed within two and one-half hours (Experiment 8). An atmosphere produced by approximately 290 c.c. in each 1000 cubic feet will sterilize ordinary pathogenic bacteria, such as typhoid, staphylococcus aureus, etc., within a half-hour, and anthrax in from forty-five to sixty minutes, and will destroy typhoid protected by an envelope of cotton cloth in one hour, staphylococcus aureus similarly protected within two, and anthrax, also in cotton, within three hours (Experiment 6). An atmosphere of approximately 435 c.c. in each 1000 cubic feet, which would be in the proportion of about a quart to a room fifteen feet square and ten feet in height, will destroy all exposed organisms within a half hour, and others protected as above within an hour and a half (Experiment 5).

The penetrating power of the gas depends largely upon the conditions as to moisture. Through dry pervious substances, as cotton cloth, absorbent cotton, hair, etc., it appears to penetrate more or less easily, but not always in sufficient amount to exert germicidal action, as is shown by the results with the tube cultures and flasks of decolorized fuchsin, which were stoppered in exactly the same manner. In the presence of moisture the penetrating power is practically *nil*. The experiments can lead to but one conclusion, therefore, that formaldehyde must be regarded and employed as a surface disinfectant, and can never be anything else, in spite of its power of penetration under favorable conditions. This conclusion is in accord with that of Aronson,[1] Pfuhl,[2] Niemann,[3] Bosc,[4] Roux and Trillat,[5] and Vaillard and Lémoine.[6]

It has been asserted by a number of authors, among them Aronson, Pfuhl, and Rosenberg,[7] that formaldehyde exerts no deleterious action on higher organisms. The results produced by the gas on the two rabbits used in the first experiment were sufficiently certain to demonstrate the falsity of this theory and to render further experiment on my part in this direction unnecessary. The experience of several others, who are daily engaged in the work of house disinfection, has shown that animals, such as dogs and cats, which have accidentally been confined in rooms undergoing formaldehyde disinfection, rarely survive the operation when the latter is properly carried out. On the other hand, the experience of these same persons is that insects, such as roaches, flies, and bedbugs, are not much affected. My observations in this direction have been limited to the cases of occasional flies, and one dish of cockroaches, all of which were killed.

[1] Ueber eine neue Methode zur Desinfection von grösseren Räumen mittels Formalin. Zeitschrift für Hygiene, xxv. 168.

[2] Untersuchungen ueber die Verwendbarkeit des Formaldehyd-gases zur Desinfection grösserer Räume. Zeitschrift für Hygiene, xxii. 339, and xxiv. 289.

[3] Zur Desinfection von Wohnräumen mittels Formaldehyd. Deutsche medicinische Wochenschrift, No. 46, 1896.

[4] Essais de désinfection par les vapeurs de formaldéhyde au moyen des procédés de M. Trillat. Annales de l'Institut Pasteur, May 25, 1896.

[5] Essais de désinfection par les vapeurs de formaldéhyde. Annals de l'Institut Pasteur, 1896, 283.

[6] Sur la désinfection par les vapeurs de formaldéhyde. Annals de l'Institut Pasteur, 1896, 481.

[7] Ueber die Wirkungen des Formaldehyds im Holzin und Steriform. Zeitschrift für Hygiene, xxiv. 488.

REVIEWS.

A System of Practical Medicine by American Authors. Edited by Alfred Lee Loomis, M.D., LL.D., late Professor of Pathology and Practical Medicine in the New York University, and William Gilman Thompson, M.D., Professor of Materia Medica, Therapeutics, and Clinical Medicine in the New York University; Physician to the Presbyterian and Bellevue Hospitals, New York. Vol. II. Philadelphia and New York: Lea Brothers & Co., 1897.

This volume contains articles on the diseases of the respiratory system, circulatory system, mediastinum, blood, kidneys, bladder, and prostate gland. So many important subjects described by seventeen contributors obviously call for great skill in editing, as well as conciseness of diction. These requirements have rarely been neglected in the work before us. As usual, the sections are not all carried out in the same lines. Some are written from a strongly individual point of view, and often, as in the article on diseases of the kidneys, with a decided gain in freshness and interest and without loss in any other respect. Others are filled with learning from the most varied sources, and often make us wish the writers had given references for the statements they quote.

The short chapter on diseases of the nose, naso-pharynx, and larynx, by S. E. Solly, gives a readable and practically useful account of those conditions in brief compass. Tastes will differ as to the advisability of including in such a work articles on the physical signs of pulmonary disease and the examination of the heart. It may, indeed, be thought that those who use extensive "systems" are familiar with such propædeutic matters. Nevertheless, no one who reads Dr. Cutler's articles will find them other than able and valuable, and it would be well if they were studied with as much care as the various chapters on therapeutics and their prescriptions are likely to be.

Fibrinous pneumonia is always a specimen-subject in works on practice. In the present one it is in the able hands of Dr. R. H. Fitz, and the fact that it covers not quite twenty pages shows great power of compression. Osler, for example, in his single volume, has the same number of pages. Fitz's definition epitomizes the subject, and shows the strength of his stand-point so well that a quotation is better than description: "Pneumonia is an acute infectious disease due to the invasion of the lung by a variety of bacteria, oftenest by the diplococcus pneumoniæ, Fraenkel's pneumococcus, and characterized by the production of a fibrinous inflammation of this organ, pursuing a more or less typical course, and manifested by a variety of symptoms in part due to the absorption of toxins from the lung." The remarks on treatment are full and sound, although the author seems to have had an unfortunate experience with the cold bath, and does not praise it as highly as we think it deserves.

Non-tubercular diseases of the pleura are well described by Herbert B. Whitney. Especially commendable are the remarks on the operative

treatment of empyema—a subject of great importance to all physicians, and especially to those who have not a surgeon within convenient reach.

The article on endocarditis, by the late senior editor, is characterized by the wide clinical knowledge and clear exposition of the lamented author. The articles on pericarditis and hypertrophy and dilatation of the heart have been well done by Dr. Warren Coleman, and Dr. Cutler has done equally well with cardiac atrophy, rupture, myocarditis, and the fat heart. The multiplication of authors on cardiac disease has led to some repetition, and, including Dr. Whittaker's characteristically complete chapters on neuroses of the heart and diseases of the bloodvessels, seems to give unusual space to these as compared with some other topics.

The chapter on diseases of the blood, by Drs. F. C. Shattuck and R. C. Cabot, is not only one of the best in the volume, but also one of the best available on the subject. We should think the sight of a man holding an hæmatocrit in his hand while using it would be much worse for a nervous patient than the noise of the machine. The authors mention this mode of use without recommending it.

We have already alluded to the excellent chapter on diseases of the kidney by Dr. H. P. Loomis. This is followed by one on pyelitis and renal calculus, by Dr. Danforth, who also treats of diseases of the bladder and prostate. Tyson describes abnormalities of form and position of the kidney and renal inadequacy with his usual thoroughness, and Dr. Coleman ends the volume with articles on abnormalities of the urine and uræmia.

The volume is well printed. It is remarkably free from errors of all kinds. In the article on cystitis, otherwise quite modern, there is a curious bit of misplaced pathology: "the epithelial cells undergo degeneration and disintegration which results in setting free their nuclei; the liberated nuclei now rapidly multiply, producing pus corpuscles." The directions for making the acetic acid and ferrocyanide test for albumin are not correct, and on page 820 "grains" appears, when "grammes" must have been intended. A strange appearance is given to the pages in some chapters by a remarkable use of quotation points.

The illustrations are more numerous than in the preceding volume. Many of them are very good; others, especially some from Lehmann's *Atlas*, suffer by comparison with those of native origin.

On the whole this volume, so far as its range of topics goes, is a worthy exponent of modern medicine. With so many subjects, a full review would far exceed the available space, and we have left unmentioned a number of chapters for this reason. The work is indispensable to the physician who wishes to keep abreast with the rapidly advancing current of general medicine. G. D.

ATLAS OF CLINICAL MEDICINE. By BYROM BRAMWELL, M.D., F.R.C.P. Edin., F.R.S. Edin., Assistant Physician to the Edinburgh Royal Infirmary; Lecturer on the Principles and Practice of Medicine in the Extra-Academical School of Medicine, Edinburgh, etc. Vol. I. Edinburgh: University Press, 1892.

THIS work, thus far, consists of three superb folios, of which the first, as above stated, appeared in 1892; the second in 1893, and the third in

1896. It is very imperfectly designated by the term *Atlas*. It is a series of monographs upon a wide range of subjects of great practical interest, the word *Atlas* serving merely to indicate the fact that illustrations constitute its most striking feature. Although the illustrations are the most prominent, they are not the most important part of the *Atlas*. In fact, it is a question whether, by distracting the attention of the casual reader, they do not to some extent impair the value of the work. This remark is not intended to decry the value of illustrations in general, still less of these in particular, but is made with the object of emphasizing the writer's admiration of the text of this so-called *Atlas*. Without the illustrations the book would have a wide circulation, for where could one turn for better articles upon Myxœdema, Hodgkin's disease, Addison's disease, Friedreich's ataxia, and many other subjects? With the illustrations, it leaves nothing to be desired.

There is one advantage, besides that of portraying disease, which is possessed by illustrations, and which makes them of inestimable value, and that is the truthfulness with which they represent its progress. A mere statement that a given disease is cured or ameliorated by a specific method of treatment is always open to the criticism that its advocate is prejudiced in its favor. Many a physician, after years of self-deception with reference to some favorite drug, can repeat with fervor the words of Cowper, and will do so publicly if he is an honest man:

> "What ardently I wished, I long believed,
> And disappointed still, was still deceived."

In Vol. III. of the *Atlas* there is a beautiful series of plates illustrating the remarkable effects of thyroid extract in the treatment of psoriasis and some other intractable diseases of the skin. No possible description in words could be so effective in teaching the value of this method of treatment.

There is a physiognomy of disease, whether physical or mental, that is recognized by the careful clinical observer, and is admirably portrayed in Bramwell's *Atlas*. In making this statement, no reference is intended to the beautiful pictures of cutaneous affections with which the work abounds, but rather to the representations of the human countenance as modified in color, expression, or shape, by disease of internal organs or by general infection. It is hard, amid such an *embarras de richesses*, to select the most appropriate examples. Suffice it to say, that every practitioner who has carefully observed a typical case of myxœdema will find his patient most faithfully depicted in the *Atlas*. The same remark is applicable to the illustrations of acromegaly, congenital syphilis, cyanosis, Addison's disease, Hodgkin's disease, etc.

The wide range of subjects included in the *Atlas* has been already alluded to, and is one of its principal merits. The neurologist, the dermatologist, the syphilographer, and the ophthalmologist will each find abundant material concerning his specialty.

At the present time, on finding a practitioner thoroughly conversant with diseases of the nervous system or with those of the eye, it is naturally assumed that he is either a neurologist or an ophthalmologist. In the case of Dr. Bramwell, however, we find that he treats, in a masterly manner, not only of the diseases of the nervous system and of the eye, but also of those of the skin, the blood, the viscera; in short, of all non-surgical affections; and we are forced to the conclusion that

he is a general practitioner. We rejoice that the species is not extinct, and trust that in some environment other than that of Edinburgh, which seems to be the most favorable, it may increase and multiply.

The writer of this brief review could find no more congenial task than that of discussing, *seriatim*, the subjects treated of in this magnificent *Atlas*. He is, however, compelled to restrict himself to a general but most emphatic statement of its value to every student and practitioner. It should certainly be in every public medical library in this country and in the private collection of every practitioner who can afford to purchase it. F. P. H.

CUTANEOUS MEDICINE, A SYSTEMATIC TREATISE ON THE DISEASES OF THE SKIN. By LOUIS A. DUHRING, M.D., Professor of Diseases of the Skin in the University of Pennsylvania; author of *A Practical Treatise on Diseases of the Skin* and *Atlas of Skin Diseases*. Part II. Classification: anæmias, hyperæmias, inflammations. Illustrated. Pp. 223 to 494. Philadelphia: J. B. Lippincott Co., 1898.

IN the day when systems and handbooks on special medical subjects are largely compiled by groups of skilled collaborators, one is ready to appreciate the courage and the patience, even the enthusiasm, of a single author, who sets himself to such a task as these pages both require and promise. Dr. Duhring is certainly entitled to great credit for the foresight and patience shown in the planning and in the pushing toward completion of his large scheme for a comprehensive treatise on cutaneous medicine. Author of a work the first edition of which was written more than twenty years ago on the same theme, a work not only then accepted as authoritative, but actually selling in the market for several years after it had ceased to be in touch with the requirements of modern medicine, its writer resisted the temptation to merely revise its pages and thus to bring it again before the medical public in merely a new dress.

He chose rather, with enormous labor and untiring energy, to write a new work sufficiently voluminous to enable one to find in its pages a fair summary of every subject of importance in dermatology, a volume prepared with such deliberation and care as to permit of a careful review of the literature of each theme.

The courage of our author is seen in his new classification, issued at a time when the subject of classification in cutaneous diseases is almost by common consent relegated to a future date, when the bacteriology of the several dermatoses shall be better understood. In the present instance most of the original classes of the old Hebra classification are retained, albeit in a different order from that in which they were at first set forth, and under these the disorders considered are arranged in such a manner that their clinical features as well as their normal and pathological anatomy receive consideration. The old class, however, in which were found the parasites, both vegetable and animal, affecting the skin, has been omitted, and the several disorders formerly thus collected are under the present arrangement to be found among the exuda-

tions, while a new class of anæmias, without the inclusion of special diseases, is placed at the head of the list.

Some odd results are thus reached. For example, it is difficult to understand how tinea versicolor is properly classed with the exudations, and comedo looks to be in strange company with the hypertrophies; but these are not the unusual, they are the common vagaries of classification. They are like the flies in the apothecary's ointment—they will be with us as long as we try to fit the facts of nature to our conventions. The classification thus devised is not without its advantages, however, and is not more defective than others which have preceded. It will probably serve a useful purpose in directing the studies of the beginner. The author probably neither expects nor desires its general acceptance.

Nearly one-half of the present Part is devoted to eczema alone, and the subject naturally receives the amplest consideration in all points of its manifold clinical features and therapy. The reader is furnished with detailed references to the work of the best modern investigators on almost every page. Evidence is not wanting that the author has modified to a degree the view he held when he first represented among Americans the teachings of the elder Hebra. For example, he writes: "In . . . cases the skin is in so debilitated a state . . . that restoration to health is not possible by local means alone. Constitutional remedies, if judiciously prescribed, will prove of benefit in many cases. Sometimes potassium iodide in small doses with an alkali may be prescribed with advantage, although the iodine preparations for the majority of cases are not beneficial," etc.

Under the title "Regional Forms of Eczema," Dr. Duhring has faithfully and fully presented the picture of every one of the many phases of this multiform disease as it is exhibited in every nook and corner of the body. In no treatise has this necessary work been done with more thoroughness and care. Large space is devoted to the diagnosis and special treatment of every variety of the disease in these several situations, and it would seem that even the wisest clinician could not fail to be instructed by a perusal of this chapter alone. In a field so carefully studied it is noticeable that the genital eczemas due to glycosuria, which were deemed by one writer in France to be of such importance as to justify their classification under the title of "diabétides," are here dismissed in a single sentence. It may be doubted whether in all these cases the glycosuria "is apt to produce eczema of the genitals,' as our author puts it. It is possible that in the severe forms occasionally encountered, where there are enormous congestion and turgescence of the parts, especially in fleshy beer-drinkers, the eczema may be responsible at times for the transitory glycosuria.

In the out-patient department of the St. Louis Hospital, of Paris, the name of one American physician is to be heard certainly every week and sometimes daily on the lips of the professors and internes of that famous French charity. The name is that of the author of the treatise before us, and the title "Maladie de Duhring" is there as familiar as with us are the designations Jacksonian epilepsy and Bright's disease.

The disorder to which Duhring's name has been thus indissolubly wedded in France is with sufficient modesty described in the pages before us by the title under which it appears in the nomenclature of the American Dermatological Association, dermatitis herpetiformis. One

is not disappointed in finding here the fullest and best exposition of the subject which has yet been given. The disease is considered in its erythematous, vesicular, bullous, pustular, papular, and multiform expressions; and the text is illustrated with eight superb illustrative plates and three reproductions of the pathological appearances of the morbid skin in section.

The value and importance of the eosinophiles in this dermatosis are well shown in the cuts exhibiting the appearance of sections of the affected skin. Gilchrist's observations for the most part confirm the statements made by Leredde and Perrin, late interne of the St. Louis. Klein and Funk go even further than the gentlemen named, and declare that in this interesting disease, where both oligochromæmia and leucocytosis coexist, the eosinophiles constitute no less than 13 per cent. of the white corpuscles visible in the blood. Duhring gives few definite statements with relation to the prognosis of the malady. At times it is certainly a disorder to be greatly dreaded on account of its persistency and the suffering it entails. At others there is no question that recovery gradually ensues, and that of a highly satisfactory character.

The illustrations accompanying the text devoted to this malady are examples merely of the fulness with which the features of each disease considered have been reproduced in plates. The wealth of the latter is only equalled by their excellence. Of the cuts illustrating the pathology of the disease, it may be said, especially of those from the hand of Gilchrist, that they suggest in general diagrammatic drawing rather than the picture which the trained eye is accustomed to see through an objective.

Dr. Duhring's work is more than a valuable addition to the literature of cutaneous medicine. It is a permanently valuable thesaurus of the accumulated knowledge of these last two decades of enormous progress made in this special department of science. Every friend of the best achievements in American medicine will wish that our author may have the patience, the courage, and the strength to bring his work to a prosperous conclusion with its final page. J. N. H.

TUBERCULOSIS OF THE GENITO-URINARY ORGANS, MALE AND FEMALE. By N. SENN, M.D., Ph.D., LL.D., Professor of Practice of Surgery and Clinical Surgery, Rush Medical College; Attending Surgeon to Presbyterian Hospital; Surgeon-in-Chief, St. Joseph's Hospital, Chicago. Illustrated. Philadelphia: W. B. Saunders, 1897.

THIS book is divided into ten parts, appropriate space being given to a consideration of tuberculosis of all parts of both the male and female genital organs, and more lengthy special chapters on the bladder, ureters, and kidneys when attacked by this disease.

Each part opens with an excellent account of the conditions which predispose to tuberculosis of the particular part, or organ, in question, and, under the head of "Pathology," there next follows a very complete and intelligent description of the macroscopic and microscopic changes which occur in the tissues as a result.

For a book which is presumably intended for the instruction of the

general practitioner, it appears to the reviewer that scarcely sufficient stress is laid upon the subjects of symptomatology and of differential diagnosis; thus, the author, referring to a few of the more common and pronounced symptoms in the affection under consideration, generally at once instructs the reader to make the diagnosis by searching for tubercle bacilli, or he tells him that the true condition of affairs can be determined by a microscopic examination of the urinary sediments. That the presence of tubercle bacilli is of the very greatest diagnostic importance, probably no one at the present time would gainsay; but a careful comparison of the clinical phenomena observed in tubercular disease with those of the other affections of the genito-urinary organs could not fail to be of very great value. This is all the more true when it is remembered that a large body of our general practitioners are without the means, or the necessary technical knowledge, for making bacteriologic examinations. The author candidly admits that frequently the bacilli, even though their presence is beyond doubt, cannot be demonstrated by the ordinary methods, and in these instances very properly directs that the question be settled by injection experiments on animals; it suggests itself that the technic of this operation could have been added with advantage. The great liability of mistaking smegma bacilli for those of tuberculosis is not referred to until it is casually mentioned in the last chapter, when speaking of the urinary sediments in tubercular nephritis. This matter certainly deserves more than the passing notice given it, and especially should attention have been strongly directed to it when speaking of tuberculosis of the external genitals. In the light of our present knowledge the statement made on page 270 —and in substance reiterated on pages 199 and 271—that "the morphology of the epithelial cells contained in the urine will indicate the location of the tubercular lesion," cannot be substantiated. At any rate, but little importance is attached to the morphology of the epithelial cells found in urine by the great majority of the authorities on the subject at the present time—with a constant tendency to assign less and less weight to it as a diagnostic sign; and if trained observers confess their inability to differentiate these cells from each other by microscopic examination, it is surely too much to expect it of those not skilled in such methods of research.

In speaking of treatment the author, on the whole, is somewhat disposed to be optimistic. In this connection the reviewer does not feel called upon to express an opinion, as our views on this subject are so largely a matter of temperament and of habit.

There are twenty-six cuts, some of which are very good.

A perusal of this work does not, perhaps, convince one of the absolute necessity for its existence; but however much we may doubt this necessity, it cannot be denied that Dr. Senn's book has been written with a great deal of care, and that, in the main, the subject has been dealt with in a thoroughly accurate and comprehensive manner. At the very least, it should serve to direct attention to these rather unusual manifestations of tuberculosis, and to this extent should be productive of good. The book is almost entirely free of typographical errors, and the publisher's work is well done. H. F. H.

THERAPEUTICS: ITS PRINCIPLES AND PRACTICE. By H. C. WOOD, M.D., LL.D., Professor of Materia Medica and Therapeutics, and Clinical Professor of Diseases of the Nervous System, in the University of Pennsylvania. Tenth edition. Pp. xxxi. 1033. Philadelphia: J. B. Lippincott Co., 1897.

THE author describes his book as a work on medical agencies, drugs, and poisons, with especial reference to the relations between physiology and clinical medicine, and he believes that it "fully represents the therapeutic science of to-day." As we read the preface to the first edition, written more than twenty years ago, we can hardly realize that so vigorous an argument for physiological therapeutics was ever necessary. Yet when we consider that empirical therapeutics then held sway, we appreciate the necessity of a forcible plea for recognition and the importance of the new departure in American therapeutic literature. The author has lived to reap the reward to which his courage, faithful study, and patient experimentation have entitled him, and to know that this edition is recognized as an able exponent of scientific therapeutics. The new edition differs from the last in the addition of about twenty-five pages and a fuller table of contents to which the pages, upon which various subjects are to be found, are inserted. Much of the new matter is to be found under the head of nucleins and animal drugs (pp. 624 to 638), and there are new paragraphs placed interstitially in the text. New sections are those upon anarcotine, eucaine, and formaldehyde. Phosphorus, instead of ending the chapter on tonics, now commences that on alteratives—a very proper change. In presenting the subjects of atropine and arsenic the author acknowledges his indebtedness to others. Of the new in this edition our chief interest lies in what is said concerning animal drugs, and we agree with the statement that "there is no scientific reason, nor yet any good clinical observation, to show that most of these substances act therapeutically in any other way than by making a psychical impression." Of substances derived from the thyroid gland, supra-renal capsules, and spleen, it can be said that their value has been proved. Of the antitoxins the results are satisfactory in tetanus and diphtheria; to a less extent in erysipelas and snake-poisoning. In noting the importance of the early administration of antitoxin in diphtheria the author very properly remarks that "modern municipal scientific methods, notwithstanding all their laudations, are liable to become causes of death" through the delays which they entail. It can also be very properly remarked that through gross carelessness and ignorance the results obtained from Board of Health examinations are often far from being trustworthy. There is so much to commend in this work that we feel considerable reluctance in calling attention to details of minor importance, but which detract from its value. We would suggest that a reading of narcotine (p. 183) and of anarcotine (p. 186) would indicate a confusion in the mind of the author which a reference to this JOURNAL (1895, vol. cx. p. 593, abstract of article by Roberts) would clear up. We consider, in view of the serious symptoms produced by smaller amounts, that the dose of chloralose (five to ten grains) is too large (p. 205). We doubt if quinine is so powerful a stimulant to the uterine contractions during labor as is stated on page 652; at least a recent collective investigation tends toward the belief that it is not more valuable than other stimulants, as alcohol, under similar conditions. Although there is no doubt

that chlorine water is capable of producing a toxic gastro-enteritis (p. 995), in our opinion its irritant properties so far as concern the mucous membrane of the alimentary tract are greatly exaggerated. Strontium bromide would have been more properly presented with the bromides than with the strontium compounds. But rarely do we find the small errors into which authors of works upon therapeutics fall. We note: arsenious acid (p. 935), fluid extract of zea mays (p. 840), of which there is none official, although the Pharmacopœia calls for one, and tubercular laryngitis, tuberculous diarrhœa (p. xxx). We are pleased to find that the author has not been led astray by the very ingenious theories of Bunge in regard to iron.

We place this edition beside its predecessors, convenient for study, in the opinion that the belief of the author as quoted in the first sentence of this review is warranted, although we miss in the reading of this book references to many reports which have come from the physiological laboratories in recent years, and with some of which the readers of this JOURNAL are familiar. It may be that time will more accurately determine their value, and that opinion should be withheld. We would regard the acquisition by the student of the facts set forth in this volume as essential to a thorough knowledge of the application of the materia medica to the disease which is to be treated. Judging from the knowledge exhibited by the average recent graduate we are expecting too much from the schools. We can keep our ideal before us, and, without being discouraged by the number of those who have failed in their attempt to master this work, still believe that this represents a remarkably successful effort to present therapeutics from the physiological standpoint. R. W. W.

APPENDICITIS AND ITS SURGICAL TREATMENT. By HERMAN MYNTER, M.D., Professor of Operative and Clinical Surgery in Niagara University, Buffalo. 8vo. pp. 303. Philadelphia: J. B. Lippincott Co., 1897.

THIS volume is a valuable contribution, and will appeal to those who study scientific subjects in a calm, deliberate, and logical manner. It is free both from wild and inaccurate assertions, which do not convince the thoughtful, and from the persistent conservatism which fails to acknowledge the necessity of progress in medical science.

The author has evidently made an extensive study of the literature of appendicitis, and has consequently given an epitome of great usefulness. The opinions of other writers are frequently quoted; and his own personal views, founded on considerable experience, are stated in a modest, practical, and judicious manner. He shows his appreciation of the fact that a scientific author must write in a manner that carries conviction by its evident judiciousness rather than by the violence of the language.

The section on diagnosis is full and valuable. He believes that there are certain symptoms which may be called cardinal, but states that every one of these may be lacking or indicate some other condition. It is their combination and their appearance in a distinct order that make the diagnosis sure. He considers the pulse more important as a diagnostic guide than the temperature in settling the propriety of operation

and determining the presence of diffuse septic peritonitis. The colon bacillus is, in his opinion, the most important etiological factor in the production of appendicitis.

Dr. Mynter believes in the operative treatment of the condition under discussion, and has operated on every case he has treated as soon as the diagnosis was clear (p. 153); and yet, in discussing the supposed rheumatic origin of some cases, he states that many early cases recover by rest and appropriate treatment alone (p. 134). He is probably correct in attributing the discordant views of physicians and surgeons to the fact that physicians see cases which recover, and therefore look upon appendicitis as being on the whole a rather benign disease, while surgeons see the severe and fatal cases, and therefore consider the affection as one of high mortality if not treated surgically. He uses opium in sufficient doses to make the patient comfortable and prevent peristaltic action, as soon as the diagnosis is made, until operation can be arranged for and performed; but objects to the use of opium as a method of medical treatment. He considers the use of cathartics in acute cases decidedly dangerous; but employs them, however, soon after the operation has been performed, preferring calomel and sodium bicarbonate, followed by salines.

His opinions may, perhaps, be summed up in the following statements: Every acute case with severe pain, vomiting, rigidity, and rising temperature and pulse, which shows no inclination to improve in twenty-four hours, is a proper case for operation. If the pulse increases in frequency and remains at 115 or over, immediate operation should be done. If the symptoms commence to abate after twenty-four hours from the onset of the disease, it is proper to wait for the quiescent period. Removal of the appendix in the quiescent period should be done after a first attack of inflammation, if the symptoms were severe; after the second attack, if the symptoms were not severe, and if tenderness and swelling of the appendix be present. He does not consider operation indicated in the quiescent period, unless palpation satisfies the surgeon that the appendix is in a pathological condition. In cases where a large abscess is present he believes it best to simply incise the abscess and drain it without removing the appendix, unless its removal is readily accomplished without risk of infecting the general peritoneum.

J. B. R.

TWELFTH ANNUAL REPORT OF THE STATE BOARD OF HEALTH AND VITAL STATISTICS OF THE COMMONWEALTH OF PENNSYLVANIA, 1896. 2 vols. CLARENCE M. BUSCH, State Printer of Pennsylvania, 1897.

CONSIDERING the meagre sum which the great and wealthy State of Pennsylvania appropriates for this most important branch of the public service, the State Board of Health presents a very creditable annual report. Vol. I. contains the report of the Secretary, the minutes of the meetings of the Board, and a number of appendices treating of various subjects; Vol. II. consists wholly of appendices dealing largely with papers and proceedings of various sanitary organizations, besides statistics, etc., of hardly more than local interest.

From the report of the Secretary it appears that blindness is increasing in the State over five times as rapidly as the population, the greater part of the increase being due to purulent ophthalmia of the newborn. This alarming fact has led to the enactment of an act requiring notification, and consequent immediate treatment, within six hours of the discovery of the first symptoms of the disease.

Owing to the very general vaccination in 1894, and the enforcement of the law for vaccination of school children, passed in 1895, smallpox has appeared in only five places, against eight and forty-one, respectively, in the two years immediately preceding. On the other hand, scarlet fever and diphtheria have steadily increased, particularly in the rural districts. The Board was called in in forty outbreaks of the former disease, or in nearly twice as many as in the year previous. Typhoid fever is also very prevalent, and the deaths from that disease alone amounted, in Philadelphia, to 40 per 100,000 of population. The great prevalence of this disease is ascribed to polluted water.

That such a lamentable condition of the public health as is shown in this report should exist is not surprising when one considers that in this great Commonwealth about three millions of people live beyond the jurisdiction of any local sanitary authority; that with all the wealth of appropriations, the amount grudgingly given for the oversight of the public health amounts to about a dollar for every 1500 of population (a total appropriation about one-twelfth as large as that for the State Board of Health of Massachusetts); that there is no suitable system of registration of vital statistics, and that the public waters are not protected against needless contamination.

Among the reports of inspections are several worthy of especial mention. Those on the purification of sewage at Reading, with nine double-page illustrations of the various parts of the plant, and on the inspection of the sources of contamination of the Schuylkill River are among them. The former may well be a source of pride to Reading; the latter should bring the blush of shame to Philadelphia, with her 40 deaths from typhoid in every 100,000 of population.

A striking example of the value of proper treatment of polluted water is cited—the experience of Girard College, where typhoid had been almost constantly present, and where the drinking-water used had been pumped directly from the river. A filtering-plant was established, and the fever began to diminish, and soon disappeared, while it continued as before among the immediately adjoining population, which still continued using the unfiltered water of the Schuylkill.

The reports of the examination of the vaccine farms, and the methods of operating the same, are very complete and instructive. Examination showed that three of the four plants in the State were not conducted with even ordinary cleanliness.

The report, taken as a whole, indicates that the State is fortunate in its Board, if not in its indifference to its health; and that the one could improve the other had it only the opportunity, which means a decent appropriation. C. H.

PROGRESS

OF

MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

REYNOLD W. WILCOX, M.D., LL.D.,

PROFESSOR OF MEDICINE AND THERAPEUTICS AT THE NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL; VISITING PHYSICIAN TO ST. MARK'S HOSPITAL.

Orthoform.—DRS. A. EINHARN and R. HEINZ state that a local anæsthetic which shall relieve the pain caused by wounds, ulcers, burns, rhagades, and excoriations must possess two characteristics: (1) absolute harmlessness; (2) difficult—*i. e.*, slow—absorbability. After considerable experimentation it is believed that these indications will be fulfilled by p. amido—m. oxybenzoic acid—methylester, which has been named as above. This occurs as a white, somewhat voluminous powder, without odor or taste, slightly and slowly soluble in water. With chlorides it forms crystals which are readily soluble in water, giving an acid reaction, and possess the anæsthetic properties of the free ester. Because of their acid reaction, their solutions are not to be used upon sensitive mucous membranes, especially upon that of the eye, or in tissues of alkaline reaction which are sensitive to acids. Therefore they cannot be used subcutaneously. The anæsthetic action of the drug is easily recognized upon mucous membranes, as when placed upon the tongue, after a few moments numbness is experienced, and later the place becomes analgesic. For complete anæsthesia the drug is employed as a fine powder; for wounds and ulcers an ointment is recommended. Various instances of its use are cited: wounds resulting from skin-transplantation, as 10 per cent. ointment; burns of the first and third degree; painful ulcerations, facial carcinoma, as powder. In such instances a distinctly antiseptic action is noted; it decidedly limits suppuration both by checking secretion and by being inimical to bacteria. This is well shown in ulcers of the feet and legs. In injuries, contused wounds, fissures in lips, nipples, or fundament, excoriations in tongue or lips, it is useful. It is a valuable remedy for the relief of laryngeal ulcerations in that an application will relieve pain for twenty-four hours, so that food can be readily taken. In gastric ulcer or cancer, in distress due to gastric catarrh or dilatation, good results should be expected, and here the soluble salts should be chosen. In genito-urinary diseases the

soluble preparations in 10 per cent. solution have given good results. One injection in a patient suffering from chronic gonorrhœa relieved his pain for twelve hours. An acute gonorrhœa, after four days, showed no gonococci, and the discharge stopped, although severe irritation followed each injection. On this account it may be well to employ emulsions, bougies, or insufflations of the free drug. Since it is absolutely non-poisonous, seven to fifteen grains can be given internally several times daily.—*Münchener Medicinische Wochenschrift*, 1897, No. 34 S. 931.

The Treatment of Membranous Enteritis.—Dr. Albert Mathieu presents the following as the fundamental principles of treatment: 1. The disease cannot be cured without relieving the constipation. 2. With this disease there is an irritation of the large intestine, which shows itself sometimes by a mucous hypersecretion and at others by hyperæsthesia and spasmodic contractions of certain zones of the colon. 3. The disease attacks by preference persons predisposed—neuro-arthritics or neurotics—and exaggerates these conditions. 4. It occurs more frequently in persons suffering from nephroptosis, enteroptosis, or from uterine or periuterine lesions. Taking up the individual conditions, in the first place the alimentary tract must be spared useless or severe irritation, so that drastic purgatives are proscribed. Aloes, which congests the rectal mucous membrane, should not be administered. Should the congestion of the alimentary tract become so marked that bloody stools result, hydrastis or hamamelis may be given. Massage is frequently badly borne, on account of the hyperæsthesia of the large intestine; but it may be useful to improve the tonicity of the abdominal muscles and those of the intestinal wall. The same may be said of Swedish gymnastics. For laxatives castor oil in gelatin capsules, or, better, in dose of one-half to one teaspoonful in black currant syrup, diluted with water, should be given ten minutes before breakfast, on alternate days, with large injections. Rhamnus purshiana, with magnesia and double the quantity of sodium bicarbonate, come second in esteem. If there is diarrhœa dependent upon constipation, ten to twenty days' use of saline purgatives or mineral water, as Rubinat or Carabaña, will prove beneficial. Great reliance is placed upon large injections, which remove the masses, reduce irritation of sensory, motor, and secretory functions of the large intestine, and, moreover, act as mechanical antiseptics. The fountain syringe, with reservoir raised one or two feet, the patient lying upon a bed with the left hip raised, boiled water at a temperature of 104° F., to which a decoction of marshmallow is added, the whole amount reaching one and one-half to two quarts, are the details of administration. If much mucus or membranes are present, then a drachm of sodium biborate or fifteen grains of sodium salicylate should be added. Injections of hot water are excellent for calming the intestinal pain. Besides, hot applications (large compresses wrung out of hot water) should be applied for twenty to thirty minutes each morning over the abdomen, or cold applications, which are equally soothing, may be substituted, and these act favorably upon the constipation. For severe pain or painful crises a pill of one-sixth of a grain of extract of belladonna will usually suffice, and this benefits the constipation. The general condition demands attention; as sedatives, ammonium valerianate is efficacious and out-door life is important. The regimen should forbid

all irritating foods and condiments; not only those which by their decomposition and putrefaction irritate, but as well those which present objections from the mechanical stand-point. With care the diet can be so regulated that an insistence upon a strictly milk-diet may be avoided. It may be necessary to make a temporary use of milk and alkaline purgatives. In case of great emaciation a diet of raw meat may be advantageous.—*Revue de Thérapeutique*, 1897, No. 14, p. 468.

M. DIGNOT has found, from observations upon twelve patients, that injections of artificial serum in amount from four to six drachms produce, in about three weeks, a total disappearance of pain and of the false membranes. One has remained cured for six months. In three others there was a rapid disappearance of glairy stools and false membranes. The success of this indirect treatment, intended to remedy the general health of the patients, always either neurasthenic or neuropathic, clearly shows that the disease is dependent upon the general health.—*Revue de Thérapeutique*, 1897, No. 21, p. 732.

Nervous Vomiting.—DR. ALFRED MEISL reviews the diagnostic points, summing up the therapy as follows: 1. For the general neurosis, change in surroundings, country air, sojourn in an institution, rest, hydrotherapy, and general faradization. 2. Diet of solids administered in small quantities. If intolerance is severe, then rectal enemata for a few days. The stomach-tube also may be used, and milk to three ounces inserted several times daily. In mild cases one-sixth of a grain of menthol with a grain and a half of sodium bicarbonate after meals, or suppositories of one-third of a grain of extract of belladonna and half a grain of codeine are useful. If there is hysterical hypersecretion, bismuth preparations with alkalies in large doses are useful. Cold applications, as ice-bag or ether spray, may assist the action of the drugs. Suggestion is to be made use of, either as to the effect of drugs, or that food which is introduced through the stomach-tube cannot be vomited, or a fast for twenty-four hours may be ordered, and then liquids in teaspoonful doses at short intervals given. After cessation of the vomiting roborant medication, iron and arsenic, best as arsenical mineral waters, and strengthening feeding are necessary to prevent relapse.—*Centralblatt für die Gesammte Therapie*, 1897, viii. Heft, S. 449.

Tannalbin.—DR. WILLIAM HENRY PORTER states that this drug appears to be nothing more than a highly dehydrated tannin albuminate. In the stomach its free administration will often arrest the superabundant outpouring of mucus. It generally augments the digestive powers, not directly, but by removing some of the factors which are causing the indigestion. It also precipitates the mucus, thus destroying one of the favorable media for the growth of the micro-organisms. In this manner it very decidedly aids in overcoming the so-called super-acidity of the contents of the stomach. In the acute diarrhœal affections of children, and particularly in those instances in which there is a large outpouring of mucus, this drug has proved very efficient. In the chronic affections it is the most serviceable, but strict attention to diet and the use of artificial aids to digestion must not be omitted, such as hydrochloric acid after meals, inspissated bile and the pancreatic

extracts before meals. To this may be added the malt extracts, such as maltzyme, which seems to have the more active diastatic action.—*The Post-Graduate*, 1897, No. 11, p. 647.

The Action of the Opium Alkaloids upon Peristalsis.—Dr. Zoltáu V. Vámossy, after a careful review of the literature bearing upon the cause of the greater inhibition of peristalsis by opium than by morphine, fails to find with rabbits any notable difference of power between the two substances. After the slight hyperæmia caused by the alcohol (tincture of opium) has disappeared, the intestine remains as quiet as with morphine. Further narcotine only slightly diminishes the reflex excitability of the intestinal wall, and does not possess any inhibitory action so far as peristalsis is concerned. Papaverine resembles morphine so far as this property is concerned, but is not of therapeutic use, because of its uncertain action. Theabaine increases intestinal excitability, and even gives rise to intense peristalsis. Narceine resembles the narcotine. Codeine increases intestinal excitability. Cryptopine and landanime act as does codeine. So far as this investigation has gone the question is unanswered. This much is evident: Opium does not possess a favorable influence upon the intestine by virtue of the accessory alkaloids which it may contain. It is of the highest importance, however, to establish the fact that physiological experiments have demonstrated that the influence of morphine on peristalsis is due to a local action.—*Revue de Thérapeutique*, 1897, No. 16, p. 511.

Argentamine.—Dr. J. S. Schulhof reports upon the use of this substance, which is æthylendiamin silver phosphate. This penetrates much more deeply into the tissues than the nitrate; it is equally astringent in weaker solutions; it is a much stronger disinfectant than corresponding solutions; it is a much better bactericide for gonococci; it possesses a higher germ-destroying power for various micro-organisms. He reports 328 instances of its use in catarrhal conjunctivitis, trachoma, catarrhal ophthalmia, ophthalmic blennorrhœa, follicular catarrh, traumatic conjunctivitis, blennorrhœa neonatorum, and eczematous conjunctivitis. The remedy is used in 5 per cent. aqueous solution once or twice daily, instilled without after-irrigation with water or sodium chloride solution. Corneal complications, even ulceration, pannus, iritis, or cyclitis, are not contraindications. It should be preserved in dark glass bottles.—*Wiener Medizinische Wochenschrift*, 1897, No. 33, S. 1525.

Cocaine and Suprarenal Extract as Local Anæsthetics.—Dr. W. H. Bates notes that in 10 per cent. solutions, cocaine is a cause of pain, owing to the exfoliation of corneal epithelium, to which it gives rise during long operations. The use of a speculum is also objectionable. This drug, in 2 to 4 per cent. solution, should be instilled every few minutes, until anæsthesia is produced, and the eye should be closed frequently. There are cases which require one-half hour or more to produce anæsthesia. If the eye is sore or inflamed, cocaine is inefficient. Here a few drops of a solution of extract of the suprarenal capsule will sufficiently relieve the congestion so that cocaine will produce anæsthesia. By this combination ether in advancement opera-

tions can be dispensed with, and iridectomies and inflammatory glaucoma operations become painless. More than one hundred operations performed during the past three years demonstrate the utility of the method. The suprarenal extract is prepared immediately before the operation by mixing about ten grains of the dried powdered glands in half a drachm of water and filtering, which results in an unirritating and non-poisonous solution. No antiseptic should be added. To prevent subsequent soreness, a fountain syringe holding a quart should be filled with water of a temperature of 115° F., to which two drachms of sodium chloride have been added, placed at an elevation of three feet, and the eye thoroughly douched, the water draining into a basin placed beneath the eye. This procedure should be repeated three times.—*New York Medical Journal*, 1897, No. 985, p. 529.

The Opium-Bromide Treatment of Epilepsy.—Dr. Warda describes Flechsig's method as follows: Opium is administered for six weeks in gradually increasing doses until the daily amount of fifteen or more grains is reached. The opium is now withdrawn, and the bromides in large doses substituted. His personal use of the bromides is described as commencing with the daily dose of ninety to one hundred and thirty grains, to continue this for three or six months, then, by reductions each six months, to come to fifteen to thirty grains daily after two or three years. Rest in bed, intestinal irrigation, and attention to diet aid this treatment. The history of forty-four patients, including eleven of Bennecke, is given, with the result that 27.5 per cent. were decidedly, the same percentage slightly, improved, 42.5 per cent. unchanged, and one became worse (fatal result). Since, according to this study, 55 per cent. were improved, the method may be understood as a real advance in the treatment of epilepsy.—*Monatschrift für Physchiatrie und Neurologie*, 1897, Heft 4, S. 257.

The Treatment of Diabetes Mellitus by Uranium Nitrate.—Dr. Ebenezer Duncan reports four instances of the use of this drug, and believes that the diminution of the urine and of the sugar in these cases and the improvement in the weight and in the general health and strength of these patients are due to the stimulating effect produced by the uranium salt on the sugar-consuming cells of the human body. This effect may be either direct or indirect through the trophic nerve centres. The sugar formed from the food of the patient is no longer excreted, and as the patient gains in weight and muscular strength it must have been consumed in adding to the nutrition of the tissues. It is true that by physiological experiments it has been proved that outside of the human body the uranium salt retards the digestion of starch, and forms an unsoluble compound with albumin, and on that ground it was thought to be likely that in diabetes its action is due to the effect it has in checking the rapid digestion of starch and some forms of albumin. The difficulties in accepting that theory are, first, that patients appear to digest their food quite normally, and even rapidly, as shown by the frequent meals for which they asked; and, in the second place, the large amount of sugar of milk taken in these cases would ultimately have overflowed into the urine if it had not been taken up by the sugar-consuming cells. It is likely that this remedy will prove to be most useful in cases of neurogenous origin, and

therefore it may form a useful test in the differential diagnosis between neurogenous and pancreatic and other forms of diabetes. In the latter class of cases it will not probably be of any value. The statement has been made that the drug is a dangerous irritant poison, producing gastro-intestinal irritation and nephritis. No injurious effect was observed in these patients, who received from five to twenty grains taken thrice daily for several weeks.—*British Medical Journal*, 1897, No. 1920, p. 1044.

Urotropin.—Dr. J. Cohn presents the result of his use of this drug, which is hexamethylentetramin, produced by the action of formaldehyde upon ammonia. In cystitis following prostatic hypertrophy or of unknown origin he finds seven-grain doses twice daily to rapidly clear the urine of micro-organisms. In the cystitis of gonorrhœa or tuberculosis the results were not satisfactory.—*Berliner klinische Wochenschrift*, 1897, No. 42, S. 914.

Euphthalmin: a New Mydriatic.—Dr. D. B. Treutler states that this drug bears the same relation to eucaine as homatropine to tropacocaine. On instillation the after-disturbances are slight and of short duration. It enlarges the pupil to the maximum when used in a 5 or 10 per cent. solution in about one-half of the time required for a 1 per cent. solution of homatropine. In the old it is not so powerful, and acts more slowly than in young individuals. It has the advantage over cocaine of less violent action and of not producing any injury to the corneal epithelium, but the disadvantage of slower action. The accommodation is less disturbed than by homatropine. The mydriasis and paralysis of accommodation pass away more rapidly than with the last-named drug.—*Klinische Monatsblätter für Augenheilkunde*, 1897, Heft 9, S. 963.

The Treatment of Typhoid Fever by Pyramidon.—Dr. Arnold Brandeis reports the results of the use of this drug, which is dimethylamidophenyldimethylpyrazolon, in eight instances. It is apparently a very much slower and milder antipyretic than antipyrine, although its effects last longer. Unpleasant symptoms, as profuse perspiration, weak pulse, and even collapse, have been noted after use of one and one-half to three and one-half grains twice daily.—*Prager Medicinische Wochenschrift*, 1897, No. 44, S. 525.

The Natural and Artificial Essence of Wintergreen in the Treatment of Rheumatism.—M. Vidal noticed, on substitution of compresses wet in essence of wintergreen for internal administration of sodium salicylate for patients whose digestive tracts and nervous systems it was necessary to spare, that in a certain percentage various skin eruptions, ranging from simple erythema to recurring papular eczema, appeared. The drug was used in fifty to one hundred drops upon a double layer of aseptic gauze and covered with an impermeable dressing. On investigation he found that the natural and artificial essences were sold indifferently in the shops. The former contains various hydrocarbons and 90 per cent. of methyl salicylate. The latter is pure methyl salicylate made synthetically. Applications of each made upon the same individual showed that the latter did not produce any cutaneous disturbance. It is probable that the eruptions caused by the former

can be explained as due to the undetermined resins (gaultherilene) contained in it.—*Les Nouveaux Remèdes*, 1897, No. 20, p. 615.

Serum-therapy in Diphtheria.—Dr. Berlin reports the outcome of the treatment of five hundred and twenty-nine children. Of these fifty-six died (10.6 per cent.). The paper shows that on the whole the mortality has been considerably lowered, but not so much as was formerly hoped for. The serum cannot be held responsible for severe untoward symptoms, nor with surety can deaths be charged to it alone. Yet it cannot be denied that it does act upon the kidneys. Post-diphtheritic paralysis and relapses are without doubt more frequent.—*Münchener Medicinische Wochenschrift*, 1897, No. 42, S. 1159.

The Medical Treatment of Toothache.—Dr. Frederic C. Coley believes that few toothaches are incapable of permanent relief without extraction of the tooth. A single dose of two grains of exalgin may relieve a raging toothache. If the pain comes on after taking food, when the contents of the stomach are naturally acid, a Seidlitz powder minus about one-quarter of the acid may relieve with astonishing rapidity. When the pain is started by "taking cold," even when what is called periostitis by the dentist is present, where the carious tooth becomes slightly loosened, projecting beyond its neighbors, and is exquisitely tender when eating is attempted, fifteen grains of sodium salicylate, repeated in four hours, will usually promptly relieve the pain. If fifteen minims of tincture of belladonna are added, refreshing sleep may be obtained. In other cases phenacetin may succeed if this treatment has failed.—*The Practitioner*, 1897, No. 351, p. 259.

The Treatment of Pneumonia with Large Doses of Digitalis.—Dr. Rubel, in commenting upon the mortality (2.6 per cent. in 1192 cases), states that in the young, robust men in a military hospital the mortality is always low (3.65 per cent. in the German army). Petrescu claims that with this method the disease is stopped in three days, and one of his pupils that the temperature falls after three days of treatment. The author reports that apyrexia is established in from seven to ten days, and that convalescence is not shortened. Instances of poisoning by this method are not unknown. —*Therapeutische Wochenschrift*, 1897, No. 39, S. 998.

Iron-Somatose.—Dr. E. Roos reports upon this substance, which is a brown powder readily soluble in water and containing 2 per cent. of iron in organic combination, the dose being about seventy-five grains *pro die*. Four instances of its use are cited, recording the increase in body-weight and percentage of hæmoglobin.—*Therapeutische Monatshefte*, 1897, Heft 9, S. 488.

The Treatment of Tuberculosis with Cinnamic Acid.—Dr. Th. Heusser finds that leucocytosis follows the subcutaneous and intramuscular injections of this substance. Later it is expected that an aseptic inflammation will wall in the tuberculous area and encapsulate it, with subsequent contraction and formation of cicatricial tissue. During the past three years he has treated twenty-two patients, with the result that six were cured, twelve improved, three without benefit, and one had died. The injections are made

into the gluteal muscles under all aseptic precautions. The dose is one and one-half minims of a 5 per cent. emulsion, which is increased by this amount until the maximum dose of fifteen minims is reached. In general, the treatment should last six months. It is claimed that this is an important remedy, the gluteal hypodermatic injections are harmless, it can cure a considerable proportion of patients suffering from pulmonary tuberculosis, but it is not a specific.—*Therapeutische Monatshefte*, 1897, Heft 9, S. 451.

Stypticin in Uterine Hemorrhage.—Dr. Max Nassuer reports in detail forty-nine instances of the use of this remedy, which is cotarnine hydrochlorate. In three instances of hemorrhage at the climacteric the results were ideal. In twelve of hemorrhage after abortion and in two after parturition the remedy was hæmostatic in a short time. In hemorrhage reappearing after curettage the results were satisfactory. In reflex or secondary hemorrhage, with diseased adnexa and uterus probably normal, the effects were excellent. For myomatous uteri the remedy seems to be efficient. In threatened abortion, in spite of the adverse report of Gottschalk, the remedy should be used not only to check the hemorrhage, but also to obtain the sedative effect which it produces similar to that of opium. The dose is one-third of a grain in a 10 per cent. aqueous solution, injected deeply into the muscles. By the mouth it may be given in grain doses four times daily.—*Therapeutische Wochenschrift*, 1897, No. 32, S. 793; No. 33, S. 827.

The Administration of Safe Anæsthetics.—Mr. H. Bellamy Gardner writes so pointedly in regard to this subject that we quote the following: "Under the heading of 'The Safe Administration of Anæsthetics' several communications have appeared lately, chiefly devoted to the worship of weird and manifold remedies (always a sign of their futility) for the difficulties and dangers of chloroform administration. I would beg to humbly suggest that if this title were transposed and our attention, and more especially the teaching in the schools, were directed to the administration of safe anæsthetics, we should have less of the terrible mortality from chloroform which week by week is reported in the medical press of the present day. From the most carefully collected statistics we know that the mortality from chloroform in England and the Continent is very nearly 1 in 2300 administrations, that of the alcohol-chloroform-ether-mixture is 1 in 5000 cases, that of ether 1 in 13,500 inhalations, while nitrous oxide gas has a scarcely appreciable mortality, and yet practitioners in Ireland and the English provinces keep writing about chloroform as if they had never heard of ether at all. Junker's methylene and chloroform inhaler, which has been used for a score of years, was actually figured during last month as if it were a heaven-sent gift and panacea for all perturbed anæsthetists. The fact is, that several deaths have occurred in connection with its employment. It is not by 'methods' with chloroform, but by learning how to give ether and nitrous oxide gas properly that the number of these lamentable deaths under chloroform can be reduced. Those of our London anæsthetists who have a lifetime of experience rely almost exclusively upon ether and gas and ether for the whole of their routine work, only giving chloroform when ether becomes inadmissible. We must, indeed, be blind and prejudiced if, to save

taking a little trouble, we go on giving chloroform to the most trivial cases requiring anæsthesia, knowing all the time that the drug is so difficult to eliminate when grave symptoms appear that we dare hardly expect to save the patient whose respiration ceases under its influence. The extreme rarity of a death from ether, and its stimulant effect upon the whole system, obvious even to a layman, is daily being more appreciated by the public, who are, after all, the best judges. They care little for the 'schools' of this and that drug; but they very rightly do not want to risk their lives for no justifiable reason, and we ought not to tempt them to do so."—*British Medical Journal*, 1897, No. 1907, p. 160.

MEDICINE.

UNDER THE CHARGE OF

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On the Theory of Addison's Disease.—MOSSE (*Fortschritte der Medicin*, 1897, No. 21) has examined the toxicity of certain organs in a typical case of Addison's disease, with atrophy and calcification of the adrenal bodies. Extracts of the adrenals, liver, and spleen were made, according to the method of Blumenthal, with physiological salt-solution saturated with chloroform and containing 0.05 per cent. of sodium carbonate. Experiments with various amounts of the extract so prepared showed that those of the spleen and adrenal, that of the liver to a less extent, were all poisonous to white mice. Control experiments with extracts of the organs of a patient dying of nephritis showed an entire absence of symptoms.

The conclusion is that the organs in Addison's disease contain a poison, and in the spleen it would seem that the poison is carried to this organ by the blood. The author draws the further conclusion that the adrenals have two functions—one the production of a physiological substance of a stimulating character, the other the neutralization of poisons formed in various parts of the body. In Addison's disease both functions are impaired.

On the Relation of Gastric Disorders to Nasal Disease.—DR. TREITEL (*Archiv für Verdauungs-Krankheiten*, Band iii. Heft 3) calls attention to this relationship, which has been curiously neglected. This neglect is all the more remarkable when we remember that gastric and pharyngeal diseases have long been recognized as frequently correlated, and recall the frequency with which pharyngeal disease has a nasal origin. French has shown how obstructive disease of the nose could set up stomach disease, by leading to in-

complete mastication. Treitel calls attention to the influence of crusts of dried nasal secretion in the pharynx. The hawking and straining due to these often cause vomiting and irritation of the stomach. Not less harmful are the chemical decompositions caused by nasal secretions; while in some persons the odor of the secretions causes loss of appetite. A number of cases are cited in which the relations of nasal disease to symptoms on the part of the stomach were observed.

In one case of ethmoid abscess the dyspeptic symptoms were probably due rather to the intense headache than to other results of the local disease. In all the cases the removal of the nasal disease was followed by improvement of the stomach. A few cases are cited from the literature. The influence of the gastric disease on the nasal mucous membrane is alluded to.

Tuberculosis of the Appendix Vermiformis.—SCHUCHARDT (*Berliner klin. Wochenschrift*, 1897, No. 41) reports a case of this kind in a man, aged twenty-two years, then serving his year in the army. In September, 1896, he was taken with pain in the ileo-cæcal region. Later a hard tumor appeared, reaching the size of an apple. Fever developed; the tumor showed fluctuation. An operation for appendicitis failed to reveal the appendix, but opened a cavity the size of a walnut, lined with tuberculous granulations. The wound healed partially, leaving a small fistula. Five months later a second operation was performed. The appendix was found adherent to the small intestine, into which it had perforated. The mucous membrane at the site of the adhesion was tuberculous. A wedge-shaped piece of the intestine was removed with the appendix. The patient was discharged in five weeks with a small granulating wound.

Gastrodiaphany.—OPPLER (*Archiv für Verdauungs-Krankheiten*, Band iii. p. 334) gives a very useful review of the literature of this subject, with references to thirty-five original articles. Of the conclusions drawn by the author, the following are most important: The instruments of Kuttner and Jacobson and of Meltzing are to be preferred. The light should not be stronger than four candles. The transillumination must take place in a room entirely dark. The stomach must be clean, the intestines as empty as possible of contents (and gas), and the bladder empty. The illumination should be made both in the horizontal and standing positions. With the empty stomach there is often no connected picture, but only a series of roundish bright spots, and in the horizontal position, on account of the sinking of the lamp, there may be no illumination at all. If the lamp is allowed to glide along the greater curvature the centres of the bright spots produced approximate the position of the curvature. In the case of a thick abdominal wall the results are erroneous, as they are in all cases when strong light is necessary. The thinner the abdominal wall the more exact are the results, though the boundaries may seem lower. It seems, therefore, that the lower boundary (greater curvature) is lower in some cases than has been supposed, but not so much so as some claim, and not in all cases. The so-called megalogastria in persons with thick abdominal walls depends on an error. By the illumination with from 500 to 1500 c.cm. of water in the stomach a bright spot is produced, the right upper boundary of which is made by the right and left lobes of the liver,

the left upper boundary by the spleen. These boundaries are more exact than can be made by any other method. The lower boundary is from 4 to 11 cm. lower in the upright than in the horizontal position, and on the whole somewhat lower than with the stomach empty. It is not certain that the line is lower in the majority of cases than the level of the iliac crests. The stomach when partly filled with water extends toward the right. The greater curvature is elevated at first, but then descends. In the horizontal position the light area moves plainly in inspiration. Standing, the displacement is slight, and in case the stomach is low down not present. In the rare cases of complete ptosis the motion is slight even in the horizontal position.

As regards pathological conditions the author says: Transillumination is able to define the position of a gastric tumor and to furnish some evidence as to its transparency, and sometimes to make probable the presence of a tumor that could not otherwise be demonstrated. The method can also assist in the recognition of a tumor of the edge of the liver, or an enlargement, tumor, or displacement of the spleen. An enlargement of the stomach can be made out by transillumination; a displacement can be claimed only where at the same time a marked motor disturbance can be demonstrated. A slight motor disturbance—gastric atony—can perhaps be demonstrated by the slight difference in the degree of mobility, by partial and complete filling with water, and by the failure of the greater curvature to rise when a small amount of water is introduced. If the upper border of the light area is separated from the liver by a dark zone which does not belong to the stomach, we can diagnosticate a gastroptosis. A low position of the greater curvature may be due to: 1. A physiological megalogastria. 2. A pathological dilatation. 3. Gastroptosis. 4. A combination of the latter with one of the two others.

The respiratory mobility of the light area is not sufficient in differential diagnosis, as dilatation and megalogastria both cause limited mobility in the upright position, and the mobility is present in gastroptosis of mild grade. Abnormal conditions of the stomach, such as vertical position and loop-shape, can sometimes be recognized.

Finally, the author emphasizes the necessity of employing all the methods of diagnosis, as transillumination does not replace them, may often lead to error, and can often be dispensed with.

Hæmochromogen as a Blood Test, with Especial Reference to the Detection of Blood in Urine.—For converting blood-coloring matter into hæmochromogen, DONOGANY makes use of pyridin and observes the color-change, or makes a spectroscopic examination. About 10 c.cm. of urine are treated with 1 c.cm. of ammonium sulphide and 1 c.cm. of pyridin. An orange color appears, especially distinct if looked at from above toward a white background. If the urine is very dark a control must be compared with the test. It is still better if the urine can be examined spectroscopically. If the ammonium sulphide and pyridin are old, they give a green or brown color to the urine, changed to yellow by the addition of ammonium hydrate. Feces and vomitus are to be dissolved in 20 per cent. caustic soda solution, the pyridin added, and the filtrate examined spectroscopically. Sputum is to be boiled with caustic soda until dissolved.

Control tests show that the spectroscopic method can show oxyhæmoglobin

in a dilution of 1:2000; Heller's test in 1:4000. Hæmochromogen can be recognized by the direct method in about the same proportion as by Heller's test, but by the spectroscope in dilution of 1:8000.—*Archiv für path. Anat.*, Bd. cxlviii. p. 234

Alimentary Glycosuria after Beer-drinking.—KREHL (*Centralblatt für inner Med.*, 1897, No. 40) has made some interesting observations. Kratschmer had previously noticed that in many persons sugar appeared in the urine after drinking beer. Krehl made examinations on the Jena students. The proportion of these in whose urine sugar appeared varied much with different kinds of beer, but was much greater after the morning drinking (Frühschoppen). Out of fourteen who drank bock or export beer in the morning, five had glycosuria. After the evening drinking, amounting in one case to seven litres, out of nineteen only one had sugar in the urine, or with Bavarian beer one out of eleven. The individual disposition was very evident. Not those who drank most had glycosuria. The difference between morning and evening drinking was probably due to variations in the absorption. As von Strümpell and Strauss have shown, alcohol favors the development of alimentary glycosuria, but Krehl thinks this is not the only cause of the results now reported. Krehl does not venture an opinion as to the nature of the process involved.

On the Mechanism by which the First Sound of the Heart is Produced.—SIR RICHARD QUAIN (*The Dublin Journal of Medical Science*, August, 1897, p. 97) publishes the results of a study he has made regarding the production of the first sound of the heart. He accepts the explanation generally given for the causation of the second sound: that it is the result of the sudden tension of the semilunar valves caused by the resistance which these valves offer to the retrograde flow of the blood from the aorta and pulmonary artery respectively into the ventricles on the cessation of systole.

Whereas, this explanation of the cause of the second sound is universally accepted, that of the first sound is, on the other hand, still much discussed and undecided. The view generally held, that the first heart-sound is produced by the closure of the auriculo-ventricular valves and the muscular contraction of the ventricular walls, Quain does not accept. He believes that the true explanation of the production of the first sound is that it is caused by the impact of the blood driven by the action of the muscular walls of the ventricles against the block produced by the columns of blood in the pulmonary artery and aorta, which press upon the semilunar valves. Sounds resembling the first (and second) sound of the heart can be produced artificially in accordance with this view.

The writer states that this explanation of the cause of the first sound of the heart, being so different from that hitherto accepted, may seem calculated to create difficulties in the diagnosis of valvular diseases of the heart. He believes, however, that a closer consideration will show that it will be found to simplify and not to confuse. It will afford an explanation for certain morbid phenomena which are at present unintelligible, such, for example, as that a systolic murmur may be heard at the apex while the first sound is audible at the base free from murmur. He thinks it will serve to encourage

a closer study of the relation between muscular contraction of the walls of the heart and the tension of the vessels of the system.

The Pathogenesis of Syringomyelia with Special Reference to its Relation to Trauma.—SCHULTZE (*Berliner klin. Wochenschrift*, October 4, 1897, S. 867) in summarizing the etiological factors in the production of syringomyelia states the following:

That the problem of the origin of syringomyelia is not yet satisfactorily solved. The disease has no constant and uniform causation, but is probably due to a variety of causes.

Undoubtedly a certain percentage of cases occur as a result of anomalies of development.

In association with such anomalies or independent of them, the disease may arise as a result of centrally situated gliomata and primary glioses with cavity formation.

Traumatism, leading to hemorrhages with subsequent softening of the hemorrhagic areas, is also an etiological factor.

The rôle which inflammatory processes as well as the narrowing and closing of bloodvessels play requires further investigation.

Pressure, from various causes, plays but a very small part, excepting in the production of hydromyelia.

Infectious diseases of various kinds may play a part in the etiology. Schultze does not believe that the disease occurs in leprosy infections.

The view that there is an association between syringomyelia and an ascending neuritis is not sufficiently supported by facts to receive much attention.

Remarks on Suppurative Cholangitis with Reference to Influenza as a Cause.—MAYO ROBSON (*Quarterly Medical Journal*, October, 1897, p. 47) states that gall-stones are the most frequent cause of suppurative cholangitis, "the disease then being a sequel of infective cholangitis, a less serious, more chronic, and distinctly curable ailment." Besides gall-stones, hydatid disease, cancer of the bile-ducts, typhoid fever, and influenza may cause suppurative cholangitis, and the writer further suspects that the disease not infrequently accompanies other acute infectious ailments.

Previous to a case occurring in his own practice, Mayo Robson does not think that influenza has been noticed as a cause. The case occurred in a woman, sixty-two years old, who had within a short time previously suffered from an attack of influenza. The symptoms of cholangitis were characteristic. Robson believed that influenza was the exciting cause of the attack, for, although gall-stones had been present for years, they had given no trouble for some time before the influenza led to the acute illness which terminated fatally. No reference to a bacteriological examination is made regarding this case. Robson says: "The afore-mentioned diseases may be more truly termed predisposing, since the true exciting cause is the presence of pyogenic organisms within the biliary passages."

The symptoms of cholangitis are then described, and finally the treatment is taken up. The writer states that cholecystotomy should be performed wherever practicable, and free drainage established until the bile is sterile.

Opening of the gall-bladder is followed by a number of therapeutic results: 1. The septic contents of the gall-bladder are evacuated. 2. Calculi, which are most frequently present there, are removed. 3. The other biliary passages, more or less obstructed, either by calculi or by swelling of their walls, are rendered as free as possible. 4. The septic bile is allowed to escape, and mechanically washes out the lower passages, carrying away through the drainage-tube many of the infectious particles. 5. The relief of pressure prevents absorption of the septic elements. 6. The relief to the kidneys, by allowing the bile to pass freely, is also of importance, as they are thus enabled to perform their function more freely in relieving the system of septic and other materials.

The occurrence of a localized abscess of the liver should be followed by free opening and drainage. Medicinal remedies, while affording some amelioration, will probably only give temporary relief.

Leucin and Tyrosin in the Urine in Erysipelas.—Dr. Thomas S. Kirkbride, Jr., makes a valuable contribution to our knowledge of leucin and tyrosin, the history of which has been full of contradictions and untrustworthy statements.

Kirkbride examined the urine of a patient with facial erysipelas, without symptoms or signs on the part of the liver. The urine contained (febrile) albumin. Toward the end of the disease crystals of leucin and tyrosin were found. The urine was acid. In order to positively determine the nature of the crystals they were obtained separately by appropriate chemical procedures and in considerable quantity. The possibility that the leucin and tyrosin were formed from decomposed albuminous substances after leaving the body seems opposed by the fact that the urine had been preserved with formaldehyde, but further investigations on the subject are promised.

Tendency to Bending of the Bones in Cretins under Thyroid Treatment.—Telford Smith (*The Lancet*, October 2, 1897, p. 853), in referring to the rapid growth of the bones of cretins while under treatment with thyroid preparations, speaks of a feature that has been repeatedly observed, namely, a tendency of the bones of the lower extremities to become bent. He gives photographs of a cretin girl at fifteen and a half and seventeen and three-quarters years of age. During the two and a quarter years the patient was under the thyroid treatment, and grew seven and a half inches. The under extremities, particularly the tibia and fibula, in the mean time became markedly bowed, as is shown in the second photograph. The explanation given for this is that under the treatment the rapid growth of the skeleton leads to a softened condition of the bones, resulting in a yielding and bending of those which have to bear weight. As cretins under treatment become much more active and inclined to run about, this tendency to bending has to be guarded against. In this connection it is interesting to note that rickets has been produced in rabbits by Hofmeister, and in sheep and goats by von Eisenberg, by removal of the thyroid gland. Whereas, in rickets, however produced, there is perverted and delayed ossification, resulting in softening and bending of the bones, under thyroid treatment in cretinism there is rapid resumption of growth in the skeleton, leading to softening,

which is most marked in the long bones and at the epiphyses. Telford Smith, therefore, recommends that cretins under thyroid treatment should be watched for any commencing bending of the bones of the legs, and if such appears the child should for a time be hindered from walking or the legs supported by light splints.

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Closure of Perforations of the Stomach by the Suturing-in of Omentum.—In performing a gastro-enterostomy upon a patient who had suffered for some time with gastric ulcer and apparently had a pyloric stenosis due to contracture of scars, BRAUN (*Cent. für Chir.*, No. 27, 1897) found that there had been a recent rupture of the stomach. There were numerous fresh adhesions which so bound down the stomach that it was impossible to bring it to the parietal peritoneum; the tissues, on account of the ulcers, were so fragile that they would not retain sutures, and it was, consequently, impossible to close the tear by any of the ordinary methods. He therefore brought up a fold of the great omentum and sutured it over the opening, the gastro-enterostomy was completed, the periosteum washed out, and the abdomen closed. The patient made a good recovery, and in the three and one-half years since that time has enjoyed good health. "This means, therefore, of closing a tear in the stomach has had a fair test; from other cases, which have since been reported, it would seem a method which, where it is necessary, is capable of rendering good service."

Osteoplastic Opening of the Orbital Cavity for Resecting the First Branch of the Trigeminus.—CAHEN (*Cent. für Chir.*, No. 27, 1897) describes the following method of operating for a deeper resection of the supra-orbital nerve after an unsuccessful operation for neuralgia. In many cases the ordinary operation does not secure the desired result, and both patient and doctor are unwilling to take the risk of a removal of the Gasserian ganglion; in these cases the author has employed and advises this operation, which has been successful in his hands.

At either end of the longitudinal incision employed in the ordinary opera-

tion, two perpendicular incisions are carried upward, and a flap is raised of skin, periosteum, and bone, which has its base upward. The remainder of the spongiosa and the tabular vitrea of the frontal bone is removed to the extent covered by the flap, the dura mater exposed, and after careful raising of the dura the orbital wall is laid bare. With a small chisel and bone-forceps the wall of the orbital cavity is removed from the orbital margin backward. This exposes the nerve, which is resected as far back as possible; the wound is then packed with iodoform-gauze and secondary sutures inserted. This method, the author believes, will be useful in many cases where entrance into the orbital cavity is desired.

The Application of the X-rays to the Diagnosis of Traumatisms of the Elbow.—The diagnostic value of the skiagraph in cases of injury involving the elbow-joint is fully appreciated by QUÉNU (*Rev. de Ortho.*, July, 1897), who reports a case that had been diagnosticated by one physician as a posterior luxation, and by another as a fracture. At the time he saw it the œdema was so great that it was impossible to determine exactly the relation of the bones; the olecranon alone was accessible, and it appeared to be in its normal position, or at least only slightly elevated. The contraction of the muscle prevented the least motion without intense suffering. A skiagraph was made, and the ulna was shown to be in a state of subluxation, the former attempts at reduction having been only partially successful. He succeeded readily in reducing the luxation, but there was so much swelling that it was impossible to definitely determine whether the reduction was complete. A second skiagraph showed that full reduction had been secured. The author says that the painlessness of this diagnostic method, its certainty and harmlessness make it of great value and almost a necessity if the surgeon would treat fractures involving joints with the greatest care and precision.

The Treatment of Exophthalmic Goitre by the Resection of the Cervical Sympathetic.—GÉRARD-MARCHANT and ABADIE (*La Presse Méd.*, July 3, 1897) base this operation upon the theory that exophthalmic goitre is due to a derangement of the cervical sympathetic nerves, especially an excitative of the vaso-dilators of the cervical sympathetic. The authors believe that the accidents generally following an either partial or total excision of goitre are due to the sympathetic nerves and not to any derangement or poisoning of the system by the secretion of the thyroid gland. The hemorrhage that is so troublesome in these operations they believe to be due to the condition of the vaso-dilator nerves. The case reported of excision of the cervical sympathetics on both sides is as follows: The patient presented the symptoms of exophthalmic goitre, the exophthalmia being the most pronounced, although there was a considerable enlargement of the thyroid gland. The line of incision was from the mastoid in a line directed toward the inner third of the clavicle; it passed posteriorly to the sterno-mastoid; this muscle was drawn anteriorly, and with it the nerves and arteries of the neck, after the resection of the external jugular vein and certain fibres of the superficial cervical plexus. The sympathetic was seen as fine filament upon the prevertebral aponeurosis of the anticus longus muscle of the neck. This was, however, not sufficient to differentiate it, and it was followed up to

the superior cervical ganglion. About an inch of the nerve was then resected. The same operation was performed on the opposite side. The patient had no disagreeable symptoms; there was a dilatation of the pupils, but no untoward symptoms of either respiration or heart-action.

There was noted a dilatation of the subconjunctival bloodvessels on the right side after the section of the sympathetic on the left side, which accords with the physiological experiments of Dastre and Morat.

The result attained was very marked; the patient had been unable to close the eyelids on account of the exophthalmia; they gradually receded, and at the end of ten days, when she was discharged, the eyelids closed readily over the eyes.

In direct contrast to the result obtained in the previous case, is that reported by CHAUFFAUD and QUÉNU (*Ibid.*): A patient who had marked exophthalmia and an enlarged thyroid, with all the symptoms of Basedow's disease, was operated on by Jaboulay's method, and both superior cervical ganglia of the sympathetic removed. The operation apparently had no influence upon the disease, the exophthalmos remaining practically just as marked, and no alteration being noted either in the size of the goitre or the pulse or respiration.

The authors do not contend that this one case demonstrates absolutely the inefficiency of this method of treatment, but they believe it should modify the enthusiastic reports of success as given by Jaboulay and others.

The Place of the Murphy Button in Gastro-enterostomy.—MEYER (*Annals of Surgery*, July, 1897), after a critical review of the cases operated upon with the use of the button, and the detailed report of his own cases, arrives at the following conclusions:

1. For gastro-enterostomy Murphy's anastomosis button is the best artificial contrivance up to date. It hastens and simplifies the operation; it enables the patient to be fed through the mouth right after the operation; the anastomosis is still feasible with its help where proper suturing is impossible. We can thus do the operation successfully with the button where otherwise we would have to abandon the same when only using needle and thread. The anastomosis made with it does not contract.

2. In using the button, posterior gastro-enterostomy (Von Hacker's operation) is preferable to the anterior one (Woelfler's), because it favors the progress of the button toward the anus. In both methods, however, the button can drop in the stomach.

3. The presence of the button within the stomach has so far never done any actual harm. This accident is, therefore, not to be considered a drawback to the use of the button.

4. In all cases where reduction of time of the operation is considered of importance, the use of the button is indicated and not the suture.

5. There is no reason borne out by practical experience which should prevent us from making use of the advantages of the button in every case of gastro-enterostomy for malignant disease.

6. If the button be used great emaciation of the patient is no more a contraindication to this operation than it is to gastrostomy in cancer of the œsophagus.

7. On account of the possible entrance of the button into the stomach, gastro-enterostomy in cases of benign stricture of the pylorus should be done with the help of the suture.

Surgical Treatment of Tumors of the Liver.—The literature of this subject and the rapid advances which have been lately made in the operations upon tumors of the liver are carefully studied by ELLIOTT (*Annals of Surgery*, July, 1897), who reports an interesting case of alveolar sarcoma which he successfully removed. The patient recovered, but died three months later from a return of the disease in the intestines.

The author summarizes the present status of the operative treatment of these tumors as follows: The symptoms are always obscure; frequently there was pain at the site of the tumor, but its position varied and had no bearing usually upon the diagnosis. The tumors were generally quite movable, even when connected by a broad base, and usually more so in a lateral direction than up and down. They all moved with the respiration. Palpation occasionally showed a direct connection with the liver; but in more than half the cases percussion showed a tympanitic zone between the tumor and the liver.

The diagnosis was made in only a few cases. These tumors were mistaken for tumors of the pancreas, mesentery, omentum, pylorus, colon, ovary, and kidney. A tumor of the right lobe can often be grasped with one hand in the loin, and the other in front and moved freely about; under such circumstances it may feel exactly like a kidney, as in the author's case, but when, in addition to this, the urine contains casts, renal epithelium, etc., an error in diagnosis is inevitable.

Operative technique: In the majority of cases reported the liver-substance was cut with the thermo-cautery, and the large vessels tied. In a few cases the knife or scissors was used. In several cases the stump was strangulated with an elastic ligature or tied in sections with silk. Gauze pressed against the wound was often effective in stopping the general oozing.

There are four methods of treating liver wounds: (1) Closing the abdomen after stopping the bleeding, and sewing the liver wound when possible, and dropping the stump (intraperitoneal). The cases show this to be a very unsafe method, except, possibly, for small tumors.

(2) Operation in two sittings. Extraperitoneal. Tillmans fixed the liver in the abdominal wound and destroyed the growth with the cautery. Lüke fastened the pedicle into the abdominal wound and surrounded it with an elastic ligature; it was cut away on the ninth day with cautery. Terrillon used the same method. Lannenstein operated in two stages, and the patient died on the twelfth day of septicæmia. Küster reports a death from septicæmia due to this method.

(3) Fixing the stump into the abdominal wound (extraperitoneal). In many cases the stump, having been tied in sections or even with an elastic ligature, was sewed into the abdominal wound, and allowed to granulate under an iodform gauze dressing. This method has the serious defect that the liver is pulled out of its position, which may injure the organ; it also causes a constant tendency to tear out the stitches—every respiratory movement pressing directly on the wound.

(4) Liver wound packed with gauze and dropped into the abdomen. Abdominal wound partly closed (intraperitoneal). The author followed this method, ignorant of its previous use, and carried it still further by walling off the rest of the abdominal cavity. This gauze packing is one of the greatest advances in abdominal surgery, and the author feels certain it will prove itself of value in these cases when applied as in other abdominal surgery.

The best procedure, the author believes, is to use a rubber tube for a tourniquet; if necessary, to tie all large vessels separately, using pressure for the oozing; to close the liver as much as possible with sutures; to drop the stump and to surround it completely with sterile gauze, packing iodoform gauze against the liver wounds, and leave the abdominal wound sufficiently open to facilitate dressing the liver wound.

Treatment of Tubercular Cystitis. — BANZET (*Ann. des Mal. des Org. Genito-urin.*, June, 1897) calls attention to the fact that there are many cases of local tubercular disease of the bladder which are not recognized, or not sufficiently early, and that they go on to a general tubercular infection of the entire system. The early recognition and treatment of this condition will result in permanent cures of numbers of cases that now die of general tuberculosis.

The treatment of this condition he summarizes as follows: The treatment should be in the main medical and the treatment of the system. This is difficult, as the patient does not realize the necessity, and frequently such cases are considered cases of albuminuria, and are put upon a milk-diet, much to their disadvantage.

A cure can be obtained in these cases by a purely medical treatment. Local treatment properly applied is indicated in all cases, and is of advantage.

Topical applications are useful from the outset; sublimate in small doses gives excellent results. The other topical applications, so far, seem inferior. Guaiacol has the advantage of relieving the local pain and irritation at the same time.

Operative interference is indicated for the subjective phenomena of intense pain and frequent micturition, which cannot be relieved by the other treatment.

Curettage of the neck of the bladder by a perineal fistula in the male, by the urethra in the female, followed by prolonged free drainage, is of particularly great value. These two procedures produce, in the majority of cases, a marked diminution or suspension of the pain, as well as a general improvement; the local amelioration is often very considerable, and is, so to speak, a cure, especially in the female.

The suprapubic cystotomy is reserved for cases where the former modes of treatment and renewed topical applications have proved inefficient, and, in the author's opinion, is never the operation of choice.

The vesico-vaginal fistula is only to be employed in the female in cases which present an intensity in the functional symptoms that is very marked and is accompanied by great pain, and after all other resources have failed.

Operative procedures are for the relief of functional derangement and pain, and are not contraindicated by general infection or a markedly debilitated condition of the patient.

Prostatic Hypertrophy.—In discussing the results obtained in eighteen cases of operation for hypertrophy of the prostate, LENNANDER (*Cent. für Chir.*, No. 22, 1897) says that he finds no further indication for a double castration than the presence of incurable disease or pathological change and neuralgias, and in these cases resection of the vas will often result in a cure. The cases of resection produced better results than those of castration, but as a systematic treatment by catheterization accompanied the vasectomy in all but one case the result may be partially attributed to that cause. In one case of a patient, seventy years of age, who had suffered from partial retention with dilatation and cylindruria, but without urinary infection, for three years, a double vasectomy produced after eight months lasting subjective and objective improvement, without the employment before or after operation of catheterization.

In such cases of dilated bladder without infected urine, and with partial urinary retention, the author believes that vasectomy can be of great value, if it is made the rule not to use a catheter except under the greatest provocation.

In cases which do not yield to catheter treatment rapidly, at least in their more marked symptoms, the author would advise vasectomy. When the cystitis, however, is rapidly making progress toward the kidneys, suprapubic cystotomy should not be delayed and may be combined with vasectomy, in the hope that after the cystitis is cured the resultant effect upon the prostate may make urination easier. In chronic urinary difficulty with dilatation of the bladder and complete retention, but without infection, it must be considered whether it would not be better to resort to suprapubic aspiration and vasectomy, and thus avoid catheter treatment and a possible cystitis.

Following out an old theory that the result of vasectomy was produced by the section of the nerves, the author in all cases includes as much of the connective tissue surrounding the cord as possible, and finds that the resected portions contain a large number of nerves in the connective tissue.

Prolonged Drainage of the Bladder per Urethram.—After a careful clinical study of a number of cases of varying character, ESCAT (*Ann. des Mal. des Org. Genito-urin.*, June, 1897) finds that the following results may be obtained by prolonged drainage of the bladder by means of a retention catheter.

The catheter can be tolerated by the urethra for months, and even years, without serious inconvenience, and during that time the entire urinary apparatus and organism are markedly benefited.

In cases of chronic retention where it has been necessary to employ continuous drainage, it is of advantage to allow the catheter to remain *in situ* until the entire system is completely restored to the normal. The apyrexia and disappearance of the signs of intoxication or infection are not sufficient, even with the aspect of the urine, to make it certain that the change from continuous to interrupted drainage will not be followed by a relapse. The change should not be made until, after due consideration of the causes and pathological changes which produced the trouble, it is found that the system has entirely regained its normal, and is free from danger and from the sequelæ which follow retention.

Without having either the acute or late disadvantages of a suprapubic cystotomy, it produces the same results without the inconvenince of the urinary fistula in cases of enlarged prostate.

Combined with a walking treatment, with either an open or a closed catheter, it assures in cases of chronic retention a very tolerable condition, and opens the way to unexpected ameliorations.

There are certain pathological deformities of the bladder and urethra in the prostatic portion which are inaccessible to this mode of treatment.

This method of drainage is readily established and well supported for an unlimited length of time.

OPHTHALMOLOGY.

UNDER THE CHARGE OF

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Disinfection of the Conjunctival Sac.—A. DALEN (Stockholm) has made an extensive experimental study of the disinfection of the normal conjunctiva in thirty patients, mostly cases of cataract. He especially compared the results obtained with solutions of corrosive sublimate and common salt used to irrigate the conjunctiva, and found that they were equally ineffective in freeing the conjunctiva from bacteria. He also found that bacteria would flourish and multiply as well under a dressing moistened with sublimate as under a similar dry dressing.—*Nordiskt Medicinskt Archiv.*, 1897, Heft 3.

LUDWIG BACH (Wurzburg) found that a mechanical cleansing of the conjunctiva and lid margin and simultaneous irrigation with an indifferent liquid have far more effect in diminishing the number of germs present than irrigation with the best antiseptics. He has not obtained a greater percentage of sterile conjunctivas by using bichloride, 1 : 5000, than by using an indifferent salt solution.

He also experimented as to the danger of infection when operating on the cornea with an infected conjunctival sac. In fifty rabbits whose conjunctival sacs were inoculated with cultures of staphylococcus, a penetrating wound 6 to 8 mm. long was made in the limbus with a sterilized curved lance. Of twenty-five cases in which the inoculation was made before the operation, infection took place in five. Of twenty-five cases inoculated after the operation, infection took place in two. In ten experiments with an infected knife, the eye became infected and was lost in nine.—*Archives of Ophth.*, October, 1897, p. 519.

J. EYRE (London) made a study of the bacteriology of the normal conjunctival sac, making cultures from 150 eyes, seventy-five of which he found yielded no colonies of bacteria. In those which did yield bacteria, twenty-eight different forms of micro-ogranisms were identified.

He concludes: 1. The conjunctival sac frequently contains micro-organisms, extremely varied in character, which may or may not be pathogenic. It may be sterile at the particular moment an observation is made. 2. When considered as divisible into an upper and a lower fornix, the former is much more frequently sterile than the latter. 3. The sterility of the conjunctival sac is due to the mechanical flushing of its mucous surface by the lachrymal secretion—aided, perhaps, to some slight extent by the bactericidal action of that fluid.—*Annals of Ophthalmology*, October, 1897.

R. L. RANDOLPH (Baltimore) experimented upon 100 cases with normal conjunctivas, and found the normal conjunctiva always contains bacteria. Of these the staphylococcus epidermidis albus must be regarded as a regular inhabitant. Bacteria found in this locality are usually of only slight if any pathogenic power. But bacteria, ordinarily non-pathogenic, may become harmful under certain favoring conditions, such as the bruising of the tissues by instruments or the irritation resulting from chemical substances.

Neither the irrigation with sterilized water nor the instillation of a sublimate solution (1 : 5000) produces sterility of the conjunctiva, and they may as well be abandoned.

The most important essential of a germicide which is to be used upon the conjunctiva is that it be absolutely free of irritating properties; and, furthermore, it should be demonstrable that this germicide will destroy the germs most commonly met with in the normal conjunctiva.

In operating upon the normal conjunctiva, as in cataract operations, the surgeon, in the present state of our disinfecting armamentarium, would do well to consider the subject of antisepsis and asepsis chiefly, if not solely, in connection with the hands, instruments, cocaine, and atropin.—*Archives of Ophth.*, 1897, vol. xxvi. No. 3.

H. D. NOYES (New York) employs the following method for the disinfection of the conjunctival sac:

The lids being separated by the speculum, the conjunctival sac is thoroughly flushed with a 2 per cent. solution of boric acid or the physiological salt solution. The stream from the rubber bulb is directed especially into the cul-de-sac above and below, into the semilunar fold, and into the outer angle. Shreds of secretion may be caught by the speculum, and great pains must be taken to remove all such material. By this proceeding all coarse flocculi are removed, and this is all that can safely be attempted.—*Medical Record*, October, 1897.

[While there may be some question as to whether anything is gained by irrigation of the normal conjunctival sac, experimental studies and practical experiences agree that there is no advantage in using an antiseptic that is in the least irritating.—ED.]

Albuminuric Retinitis.—J. W. H. EYRE (London) reports two cases which seem to throw some doubt upon the common belief that retinal lesions only appear at a late stage of kidney disease. A man, aged fifty years, when first

seen had impaired vision and the typical ophthalmoscopic picture of albuminuric retinitis; but his urine, though of low specific gravity, was free from albumin or casts, and remained so for ten days. These appeared coincident with a diminution in the quantity of urine, and he died within two months of uræmia. The kidneys post mortem exhibited a typical picture of acute Bright's disease.

The second case, a woman, aged thirty-seven years, had impaired vision and albuminuric retinitis, but the urine was found normal. Eleven days later tube-casts were first discovered, with albumin, and general anasarca occurred. She subsequently made an incomplete recovery.—*Ophthalmic Review*, 1897, p. 275.

[May not such cases indicate that if retinitis is a late symptom the kidney changes may also be a late symptom of advanced general vascular disease? —ED.]

Tobacco Amblyopia, with Slow Improvement.—A. H. THOMPSON (London) reports four cases occurring in men from thirty-six to fifty-four years of age, who, during the periods of treatment, all denied that they were smoking or chewing at all.

In the first case vision equalled 6/LX, and no improvement took place for three months. Seven months later a cure was complete. In the second case vision equalled 6/LX. There was no improvement for three months, but in six months one eye had vision of 6/XVIII.

In the third case vision was: Right, fingers 2 ft.; left, 2/LX. There was no definite improvement for seven months, when the left eye showed improvement in the color scotoma, and later for test-type, and at the end of nine months had gained vision of 6/XVIII. In the fourth case, vision 3/LX, no noticeable improvement had taken place at the end of one year, yet at the end of the second year perfect vision was restored to each eye.—*The Royal London Ophthalmic Hospital Reports*, vol. xiv. Part II.

Detachment of the Retina.—SCHMIDT-RIMPLER (Göttingen) opposes the theory that detachment of the retina is commonly due to traction by fibres newly formed through previous disease of the vitreous. The tears in the retina, of which this theory makes so much, are not found in the majority of cases, and there is not the homogeneity of the preretinal and subretinal fluids which this theory supposes. The difference between the two fluids is found on anatomical examination, and is proved in the mass of cases by the tendency of the subretinal fluid to gravitate to the lower part of the eyeball.

Then the traction theory does not suit cases in which the retina becomes reattached and again detached; nor the detachment due to traumatism, anæmia, phlegmon of the orbit, albuminuric retinitis, etc., without previous disease of the vitreous. He answers objections to the secretion theory, and explains that sudden appearance of symptoms may not be due to suddenness of exudation, while the idea that retinal detachment is always accompanied by decreased tension has been abandoned.

The traction theory may, however, correctly explain some cases of detachment following disease of the vitreous. Schmidt-Rimpler opposes such treatment as division of the supposed vitreous fibres, or injections into the

vitreous of iodine, or dilute vitreous from the rabbit. He favors the pressure bandage, dorsal decubitus, diaphoresis, mercurialization, scleral puncture, and treatment proper to choroiditis.—*Deut. Med. Woch.*, 1897, No. 44.

Ivory Exostosis of the Orbit.—W. F. NORRIS (Philadelphia) reports a case of this disease in a man, aged twenty-four years, who had noticed the tumor for six years, and attributed it to a blow received four years before that. The symptoms for which he sought its removal were occasional severe headaches and dizziness. The movements of the eye were limited outward and upward, causing diplopia in the corresponding portion of the field. On its removal the base of the tumor was found to involve most of the orbital plate of the ethmoid and a portion of the lachrymal bone. The dizziness and double vision were entirely relieved, and the patient remained well fourteen months after operation.—*Transactions of the American Ophthal. Society*, 1897, p. 67.

R. SATTLER (Cincinnati) made a supplementary report on a case of ivory exostosis. He found a fistulous opening remaining eight months after the first operation. On investigating it was discovered that an additional exostosis existed, which had pushed the orbital plate of the frontal bone upward, and had hollowed out a large cavity for itself, completely concealed above and behind the overhanging orbital margin. The orbital plate of the frontal bone had yielded to the pressure of the growth, so that a cavity fully as large as a pigeon's egg had resulted, and the plate was so thin that at the time of operation brain pulsation could be distinctly observed. Recovery, however, was prompt and complete, without any brain symptoms.—*Transactions Amer. Ophthalmological Society*, 1897.

The Diagnosis of Ocular Paralyses.—A. DUANE (New York) points out that this is based partly upon the characteristic restriction of the movements of the affected eye in some particular direction, and partly upon the relations of the double images. In either case it depends upon the fact that, in order to move the eyes in any given direction, a special muscle or set of muscles is brought into play in each eye, which muscle or muscles move their respective eyes at precisely the same rate, and which gradually cease to act as the eyes are carried in the reverse direction. While in all pronounced cases of ocular paralysis the lagging of the affected eye behind the other in the performance of associated movements is easy to recognize, the most satisfactory and certain evidence of the trouble is obtained from the double images. For determining these, the following method probably gives the most accurate results.

The patient is placed (preferably in a dark room) with his head fixed and with his eyes in the primary position—*i. e.*, with both directed straight ahead and on a level, and a red glass is placed before one eye. A lighted candle, which, in order to avoid the disturbing effects of projection, should be not less than three or four feet from the patient, is carried successively to the right, left, up, down, and obliquely, and the patient is asked whether he sees two images of the flame, what is their color, how they are placed with regard to each other, how far they are apart, and whether the distance between them increases or diminishes as the candle is carried in each direction. If he sees one flame (yellow, with a pinkish border), he has binocular single

vision. If he sees one flame, which, however, is pure red or pure yellow, he probably has double vision, but ignores one of the images (monocular vision). If he sees two flames, one red and the other yellow, he has diplopia, the nature of which is indicated by the relative position of the red and the yellow flames.—*Archives of Ophthalmology*, 1897, p. 317.

OTOLOGY.

UNDER THE CHARGE OF

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Caries of the Recessus Hypotympanicus.—KRETSCHMANN maintains that disease of the recessus hypotympanicus or the "cellar" of the drum cavity, is more frequently the seat of necrosis than has been supposed (*Verhandl. der Deutschen Otol. Gesellschaft*, 1897). This lesion is rarely an isolated one, being commonly found in conjunction with caries and necrosis of other parts of the middle-ear cavities. Sometimes caries of the floor, or "cellar" of the drum-cavity, runs inward under the labyrinth wall or outward under the floor of the auditory canal, beyond the plane of the annulus tympanicus. Sometimes carious spots in the hypotympanic space may be recognized with a probe before radical exposure of the region by operation on the posterior inferior wall of the drum-cavity; but often caries in the tympanic cellar is not discovered until the so-called Stacke operation has been performed upon the attic and antrum. Kretschmann has found caries of the hypotympanic space so often in connection with caries of the epitympanic space, or attic of the drum-cavity, that he feels in most cases, to make a radical operation really what it is called, the hypotympanic space must be reamed out at its posterior portion after the surgical exposure of the attic and antrum. He prefers in some ways revolving (cylindrical) burrs to the chisel and hammer for the hypotympanic operation. Ten of his operations, the first half of his series, have been performed with hammer and chisel; the remaining ten, with the burr. He admits that surgical work in this region comes very near the jugular bulb in the front part of the floor of the drum-space and close to the facial canal in the posterior part of the cavity. The jugular bulb is not threatened, however, as often as the facial canal, because caries of the cellar of the drum-cavity is more likely to be near the facial canal than over the bulb in the front part of the tympanic floor.

[The simple presence of caries anywhere in the drum-cavity, while the necrotic ossicula are present in whole or in part, is not sufficient reason for a radical operation exposing this cavity, before the two largest necrotic ossicula or their remnants are excised, because we have seen repeatedly large carious surfaces in the tympanic space cover in with normal healthy muco-periosteum, and the discharge of pus from the drum-spaces cease permanently,

after excision of the necrotic ossicles, and all need of any form of surgical interference in this region cease. Therefore, in the absence of symptoms of a lesion of deeper parts—pain, fever, tumefaction, tenderness to pressure about the ear—surgical removal of the ossicles should precede by a long period more radical operations in or upon the drum-cavity. This alone may check all suppuration, and certainly act as a prophylaxis against thrombosis, meningitis, and cerebral abscess. If excision checks or greatly diminishes the otorrhœa, the mastoid operation becomes unnecessary.—ED.]

Burrowing Abscess Beneath the Mastoid with Retropharyngeal Abscess after Acute Otitis Media.—HAUG reports the occurrence of the above-named lesion in a young man, aged seventeen years, whose ear had been previously normal. In this instance spontaneous perforation of the membrana tympani took place on the fourth day of the acute otitis. The disease was then treated by means of syringing with solutions of boric acid and insufflations of powdered boric acid, before Haug saw the case. On the eighth day the discharge suddenly ceased and the earache returned. A few days later pain and tenderness in the mastoid were observed, and fever, with general malaise, set in.

[Here is clearly an instance of secondary infection of the middle-ear and mastoid cavity, by an excessive and irritant therapeusis, so that it can be boldly stated that acute mastoiditis following acute otitis media is always the result of secondary infection, either from septic domestic treatment or a defective local therapeusis of the inflamed ear—*i. e.*, it is an artificial production and not a necessary result of the acute otitis media.—ED.]

Four weeks after the beginning of the otitis the discharge had ceased, the membrana contained a small nipple-like perforation behind and beneath the malleus, and the posterior superior wall of the auditory canal was prolapsed. The periauricular region was swollen and tender, and all motions of the jaw were painful. The head could not be turned, and the patient carried his head like one affected with torticollis. The infiltration beneath the mastoid extended backward to the occiput and downward to the clavicle. This swollen region was tender to the touch, the general condition of the patient was bad, his temperature being 39.9° C., his pulse 96–100, and he was semicomatose. Two days later difficulty in swallowing was observed, but inspection of the pharynx revealed only hyperæmia on the left half of the soft palate and tonsil, the side of the affected ear. Paracentesis of the membrana was now performed, and a considerable quantity of pent-up pus escaped. The next day, however, though pus continued to flow from the drum-cavity, the general condition of the patient was worse. Therefore the mastoid cavity was opened, and the large pneumatic mastoid space thus laid bare was found nearly filled with pus and granulations. The antrum contained only pus. A probe could be passed from the bottom, or tip, of the mastoid cavity into a sinus leading into the tissues of the neck. A counter incision was therefore made, 3 cm. deep, along the posterior edge of the sterno-mastoid muscle until the deep fascia was reached, which being punctured, pus escaped. Notwithstanding an amelioration in the aural and nuchal symptoms, the fever did not subside, and the patient became more apathetic, soporose, swallowing became very difficult and painful, and dyspnœa set in. The left side of the

fauces was now found to be enormously swollen, temperature 39.8° C., and the pulse 112 and thin.

The case had now become one of pharyngeal or retropharyngeal abscess, and two days after the mastoid operation an incision beneath and behind the left tonsil, widened by the introduction of a probe 2½ cm. into the tissues, gave vent to a coffeespoonful of thick, yellow pus. The bacillus pneumoniæ was found in the pus, coming from pharyngeal as well as from the mastoid abscess. Entire recovery in all respects, including the hearing, ensued in six weeks.

Treatment of Sclerosis of the Middle Ear with Thyroidin.—A. EITELBERG has published his results in the treatment of sclerosis of the middle ears with thyroid tablets in eight cases (four men and four women). Of these, one containing about five grains was given daily, for periods varying from thirty to eighty days. Bruhl, Alt, and Vulpius had already preceded Eitelberg with this form of treatment of aural sclerosis. Vulpius concluded that if no good results ensued in two weeks, the treatment should be abandoned. But Eitelberg maintains that at least a month's treatment is necessary before conclusions as to the results of such treatment can be formed.

In none of his eight cases had he any bad results, either in the ears or general system. In some of his cases there was great improvement in the general health. The age of the patients varied from thirty to fifty years. Some loss of weight occurred in two cases; the sexual impulse was quickened in three of the men, and a permanent improvement in hearing was obtained in three of the eight cases.

The author states that he was always on the watch for any disturbance in the general health, weakened heart action, and broken sleep. If any of these symptoms occurred the treatment was stopped for two or three days. Very rarely was it necessary, however, to make any pause in the treatment. In two cases, one man and one woman, subject to nervous palpitation of the heart, the treatment was borne surprisingly well.—*Archiv f. Ohrenk.*, vol. xliii. Part I.

Ostitis of the Mastoid Process in Consequence of Infectious Otitis Externa.—HESSLER again draws attention to the fact that ordinary furuncles in the external ear differ greatly in their effects upon the subjacent bone from inflammations and ulcerations excited in the auditory canal by self-injury with instruments inserted into the meatus by the patients for scratching in cases of pruritus.

The cases presented by Hessler as illustrative of the above-named conditions were those of two women who had scratched their auditory canals with hair-pins to relieve itching. This act was repeated for several weeks, as the pruritus continued, and finally there occurred earache, malaise, chills and fever, with symptoms of mastoid empyema. Mastoid chiselling revealed in both instances a spongy, brownish, brittle condition of the bony structure of the mastoid cortex and cavity, but no inflammatory swelling of the epithelial lining, no secretion, and no caries.—*Deutsche med. Wochenschrift*, 23d year, No. 29.

[These cases demonstrate how easily a rough therapeusis of the acutely

inflamed auditory canal, by means of swabs, probes, and the like, may provoke an infectious irritation and inflammation of the soft tissues over the mastoid antrum and lower anterior cortex of the process, and finally produce a mastiod inflammation which, though considered a necessary result of the primary inflammation in the ear, is in reality a purely artificial production by rough treatment.—ED.]

OBSTETRICS.

UNDER THE CHARGE OF

EDWARD P. DAVIS, A.M., M.D.,

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The Antiseptic Performance of Embryotomy.—In the *Centralblatt für Gynäkologie*, November 29, 1897, KOSMINSKI describes his method of performing embryotomy with the aid of specula which protect the walls of the cervix and vagina from contact with hands or instruments. He has devised large blades which form a speculum, each shaped somewhat like a spoon, and making it almost impossible to infect or injure the cervix or vagina. In craniotomy, having introduced his specula, he grasps the scalp with tenaculum forceps, incises it, and applies the perforator or trephine directly by means of sight. He is very careful to remove the brain completely, and to remove all pieces of bone without wounding the mother's tissues. He urges that it is much safer to perform craniotomy guided by vision than in the usual way. After the head has been emptied, the specula are removed and delivery accomplished by the cranioclast. He describes five cases in which the operation was easily and successfully performed.

He has also employed this method in cases of transverse positions in which decapitation and embryotomy were required. He has found great advantage in being able to see the tissues operated upon, and has been able to protect the mother especially from injury by the fœtal ribs. He reports four cases of successful embryotomy by this method.

A Rare Case of Lithopedion.—In the *Bulletin of the Johns Hopkins Hospital*, November, 1897, CLARK reports a very interesting case of lithopedion. The patient was a colored woman, aged forty-five years. She complained of pains in the lower abdomen, enlargement of the abdomen, and dyspnœa. She had been married fourteen years and had three children, her labors having been complicated by adhesion of the placenta and slight fever after labor. Four years before admission to hospital menstruation ceased, and symptoms of early pregnancy developed. She became weak and miserable toward the end, and had to go to bed. Fœtal movements were plainly felt. About the time for labor she had severe pain in the left side, and much watery fluid

passed from the vagina. She had declined operation previously. On admission, she was very constipated and mentally depressed. On examination, a hard tumor was found in the abdomen lying obliquely from left to right. Under anæsthesia the uterus was found normal in size, and on the right side a boggy mass in close relationship with the hard tumor.

On opening the abdomen, adhesions were found between the anterior abdominal wall and the back of the fœtus. Dense adhesion bound the gestation sac to the intestine. The placenta was necrotic. A mottled yellow tumor was found closely adherent to the abdominal wall. The fœtal head was in close contact with the spleen, and the left arm and shoulder near the umbilicus. The fœtus was lying obliquely in the abdomen, its chest close to the aorta. It was gently delivered by grasping the head, and the cord was cut close to the placenta, which was attached to the floor of the pelvis. The sac was densely adherent to the appendix, cæcum, and intestines. The sac was dissected free and enucleated with the right tube. The placenta was very friable and was removed piecemeal. The abdomen was irrigated with salt solution. The patient made a good recovery.

On examining the fœtus the skin of the face and forehead resembled burnt leather. The membranous envelope, probably the amnion, was attached to the fœtus, but could readily be separated. On examining the body of the child, saponaceous material could be found, also gritty particles.

Peripheral Neuritis in Pregnancy and the Puerperal State.—Reynolds (*British Medical Journal*, 1897, No. 1920) reports two cases of peripheral neuritis, one in pregnancy and one following labor.

The first was a patient, aged twenty-four years, who had such severe vomiting that abortion had to be produced. For two or three weeks after she could not control the bladder and rectum. About a month after the abortion sensation was impaired in the lower extremities. There was also complete loss of power, wasting, and contraction. The knee-joints were straightened under chloroform and fixed in splints. Under electricity and massage the patient improved. Her improvement, however, was very gradual, and before recovery ensued another pregnancy occurred, terminating in a normal confinement. Following this she became so much better that she could take short walks. In this case there was no previous history of alcoholism.

The second case was that of a patient who bore a child when she was eighteen years old. She had pyæmia and paralysis of the legs. The muscles were atrophied and the knees contracted. She made a recovery under the prolonged use of massage. A slight lameness remained from contraction of the toes. In this case also no history of alcoholism could be obtained.

Reynolds has collected forty-nine cases, excluding those unilateral caused by forceps or exudation into the pelvis. The disease is more common in multiparæ. One-fourth of the cases were during pregnancy, while in one-third there was a history of some form of sepsis. In eleven cases marked and incessant vomiting was present. It was not possible to trace a connection with alcoholism, and sepsis and incessant vomiting are the most potent causes. The disease began in the legs, then extended to the arms. The muscles were wasted and there were disturbances of sensation. In fourteen cases there was either no recovery, or but partial cure. In twenty-two cases

recovery was complete, while in thirteen no mention was made of the termination. The prognosis is worse when the paralysis is general, and best in the partial cases. As regards its pathology, degenerative neuritis has been found.

Ptyalism During Pregnancy.—LVOFF (*Centralblatt für Gynäkologie*, 1897, No. 29) reports two cases of multiparæ who suffered from excessive secretion of saliva. In both this occurred at the second month, and increased during the third. Both patients had laceration and erosion of the cervix. The secretion was so profuse that the patients were excessively annoyed by it.

In one case the cervix was cauterized, bromides and cocaine were given, and, later, atropine, with good results. In the second case this treatment was without result, and abortion was procured. This was followed by cessation of the salivation. The writer considers this disorder as akin to pernicious nausea, and thinks both are caused by retention of decomposed albuminoids in the blood.

Different Methods of Incising the Uterus in Cæsarean Section.—JOHANNOVSKY (*Monatsschrift für Geburtshülfe und Gynäkologie*, 1897, Band vi., Heft 4) reports two Cæsarean sections on the same patient, in which different methods of opening the uterus were adopted.

The patient was a woman, aged twenty-six years, having a rhachitic flattened pelvis. In the first operation the usual incision in the anterior wall of the womb was made, and the uterus closed with deep and superficial stitches of silk. During the recovery stitch-hole abscess occurred, and considerable formation of pus with prolonged fever persisted for three weeks. The patient made a good recovery, the uterus being the size of the fist, anteflexed in the median line, the fundus being just below the umbilicus. It was firmly adherent to the abdominal wall. There remained also a small fistula just below the umbilicus communicating with the uterus. This occupied the position of one of the stitches.

The patient disappeared from observation and returned again in the pregnant condition. She stated that she had had a seven-months' spontaneous labor, the child being dead. She had made a good recovery. She was then approaching the end of her third pregnancy. The fistula still remained, and was about the size of a horse-hair. In view of these facts it was determined to perform Cæsarean section again and to open the uterus on its posterior wall.

The abdominal incision was made on the right of the old scar, and the adhesions were separated by the finger excepting those about the fistula, where it was necessary to use a knife. The uterus was turned out of the abdomen, and an incision parallel to the long axis of the uterus was made on its posterior wall. The child was easily grasped by the feet, was asphyxiated, and could not be revived. The uterus was closed with silkworm-gut, and also the abdominal wound. The patient made a good recovery. The fistula closed, the uterus was anteflexed, the fundus two finger-breadths above the pubes. A slight fixation of the cervix on the right side was present. The pelvis, however, was otherwise free from adhesions. The patient was examined a year afterward and found in good health.

Incision of the posterior uterine wall was advised by Cohnstein in 1881. It was, however, opposed, as it was urged that the absence of adhesions to the anterior abdominal wall would allow a more ready escape of the contents of the womb into the abdomen. It was also urged that adhesions between the uterus and the bowel might occur.

The classic method has consisted of incision into the anterior uterine wall. This has been thought safer, as the adhesion between the uterus and the peritoneum shuts off the uterine from the peritoneal cavity. As an objection to this incision, it is urged that it is so made that the stitches are inserted parallel to the bloodvessels, and hence the vessels are not securely ligated by the stitches.

Sänger's method of incising the uterine wall near its junction with the cervix is of theoretical interest, but has never been accepted.

Fritsch has recently advanced the claim of the transverse incision across the fundus. Sufficient experience has not yet accumulated to inform us regarding the merits of this method of operating. It has, however, many theoretical points in its favor.

[We recall a case of Cæsarean section in which the patient could not be thoroughly prepared, in which stitch-hole abscess occurred from infection from the skin. In this instance the abscess extended to the uterine wall, but gradually closed. As some cases of Cæsarean section must always be emergency operations, the possibility of infection from the skin must not be overlooked.—ED.]

A Case of Tuberculosis of the Placenta.—In the *Scottish Medical and Surgical Journal*, 1897, vol. i., No. 2, KYNOCH reports the case of a pregnant woman who died of acute tuberculosis. On post-mortem examination a pregnancy of three months was found. Both Fallopian tubes were distended with caseous material, while the placenta was studded with gray tubercles. The ovaries were filled with semifluid caseous material in which tubercle bacilli were found. There was no obvious tubercular lesion in the fœtus.

The primary seat of the disease was in the Fallopian tube, thence it had spread upward to the ovaries, peritoneum, lungs, and liver, and also to the uterus and placenta.

The Advantages of Credé's Method for Preventing Ophthalmia.—In the *Archiv für Gynäkologie*, 1897, Band liv., Heft 1, SCHALLEHN urges the value of Credé's method for the prevention of ophthalmia. Among 917 infants two had inflammation of the eyes. Both cases developed eight days after birth, and were not severe. Immediately after labor no case developed, and the cause for this immunity is said to be the routine employment of nitrate of silver instillations. In no case were any bad results observed, nor was any inflammation seen to follow the use of the silver nitrate.

Is Routine Uterine or Vaginal Syringing Necessary after Parturition?—HORROCKS (*The Practitioner*, 1897, No. 352) discusses this practical and important question.

He cites the experience of Guy's Hospital Lying-in Charity. The work is entirely out-patient practice, and attendants are urged to cleanse the hands

thoroughly with bichloride 1 : 1000. During three years' time 9097 confinements were attended in one of the lowest and poorest quarters in London, with septic mortality of $\frac{8}{100}$ of 1 per cent. No syringing was employed in these cases. This is certainly an excellent test as to the value of this method. He reports two cases where infection occurred by the process of syringing. In one a dirty syringe, which had been used at a former confinement three years before, was the cause of the trouble. In the other case a person having erysipelas had helped to draw the water employed in the douching.

Carcinoma of the Uterus During Pregnancy.—In the *Zeitschrift für Geburtshülfe und Gynäkologie*, 1897, Band xxxvii., Heft 1, OLSHAUSEN gives the results of his experience in cancer of the uterus complicating pregnancy. In the matter of diagnosis he calls attention to the irregular bleeding which occurs in cancer, and which may obscure the diagnosis of pregnancy. The shape of the body of the uterus can usually be outlined, and this should make a diagnosis of pregnancy evident. In considering the treatment one must remember that carcinoma grows with frightful rapidity in the pregnant or puerperal patient. For this reason radical operation should be resorted to as soon as a diagnosis is made. As regards prognosis, cases are reported free from disease from eight to three years after operation.

Olshausen operated upon nine cases up to the end of 1895. One died six months after operation from an unknown cause. In four the disease returned at intervals varying from five months to three and one-half years. Four remain well from two and a half to seven and a half years after operation.

As regards treatment, four methods of operating are available. The first is the total extirpation of the pregnant uterus through the vagina. Second is the extirpation of the uterus through the vagina after the womb has been emptied. Third is the total extirpation of the pregnant uterus, which is cancerous, through the abdomen, and fourth is Cæsarean section, with or without extirpation of the uterus afterward. Olshausen concludes that, in the early months of pregnancy, the cancerous uterus should be removed through the vagina. Most writers think that it is impossible to operate in this manner after the fourth month. In one case, however, Olshausen operated successfully at the fifth month, and in another toward the end of the sixth. The results of this operation are good.

Olshausen reports four cases in which abortion was first produced, and afterward the uterus extirpated through the vagina. Each of these cases made a good recovery. He allowed from eight to ten days to elapse after the abortion before removing the uterus. He also reports four cases in which the uterus was extirpated through the vagina after spontaneous birth or abortion. These patients also did well.

As regards the amputation of the pregnant uterus through the abdomen, and the extirpation of the cervix afterward through the vagina, Olshausen is not in favor of that procedure. He considers the risk of infection greater, and the probability of return also greater.

In two cases Cæsarean section was performed. In one instance the mother died six months afterward of cancer, while in the other septic infection and death occurred five days after operation. In conclusion, Olshausen urges in

cases requiring Cæsarean section that the womb be closed by suture and then extirpated through the vagina.

The Toxicity of the Urine in the Last Month of Pregnancy.—Among the many interesting contributions to this intricate subject is the paper by STEWART, of Cincinnati, describing a series of experiments upon animals (*American Journal of Obstetrics*, August, 1897). His method consisted in selecting at random from patients in the last month of pregnancy urine which was carefully kept in sterile jars; it was concentrated by boiling, neutralized with sodium bicarbonate, and filtered. It was then injected into the abdomens of rabbits under careful antiseptic precautions. In most cases death followed the injection, preceded by clonic and tonic spasms. The coefficient of toxicity by this method was fixed at 24 c.c. to the pound of animal. A comparison was made with these experiments by taking urine from non-pregnant gouty women, and also from a young girl not pregnant, and, so far as known, perfectly sound. The same result followed the injections in these cases. Stewart is led to conclude that there is no especial toxicity in the urine of women in the last month of pregnancy.

[It would be interesting to compare these experiments with those made by injecting concentrated solutions of potassium salts in like manner. It is quite possible that the process of boiling developed irritating compounds not normally in the urine, capable of producing convulsions and death. There remains still further to be remembered that it is not the contents of the urine in the last months of pregnancy which produce eclampsia, but the toxic substances which are not eliminated, and therefore are not present in the urine, but remain stored up in the liver and circulated in the blood of the eclamptic patient. As has been recently shown, the same poison which produces eclampsia tends to cause thrombosis and embolism. Such follow the circulation in the blood of compounds formed by cell necrosis present in various disordered conditions. It is not the eliminated poisons of the body which cause eclampsia, and the source of the convulsions probably does not reach the urine at all. The examination of the urine is simply the reading of a gauge to determine the condition of the mechanism within the body. The urine is but an index of the patient's elimination.—ED].

The Frequency of Contracted Pelvis.—In the *American Journal of Obstetrics*, August, 1897, DOBBIN gives the results of the measurement of 350 cases to determine the presence of pelvic abnormality. In 40 of these women the pelvis was contracted, a percentage of $11\frac{45}{100}$; of these the generally contracted and flat rhachitic were equally common, being 35 per cent. of the whole number. Then came the simple flat and then the irregular form. A large number of negro women were among those measured, and among them rhachitis is frequent. About one-third of these patients were delivered spontaneously, and half of them required instrumental delivery.

[We have measured all patients applying for hospital treatment for five years past. The number of measurements considerably exceeds that of Dobbin, and the results agree substantially with his. He urges very properly that only the routine measurement of all pregnant patients available before labor can determine the frequency of contracted pelves.—ED.]

GYNECOLOGY.

UNDER THE CHARGE OF
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OF NEW YORK.

The Danger of Pregnancy after Ovariotomy.—LAROYENNE (*Revue internat. de méd. et de chirurgie*, No. 1, 1897) reports the following interesting case. An easy ovariotomy was performed in the case of a young multipara. She menstruated only once after the operation. During the second month of pregnancy she was suddenly seized with severe abdominal pains, accompanied with dyspnœa and vomiting. Five days later she was admitted to the hospital in a moribund condition, and died the following day. At the autopsy the peritoneal cavity was found to be filled with coagula. The hemorrhage had come from the stump, the ligature having slipped in consequence of traction due to the growing uterus.

Prevention of Impregnation by Division of the Tube.—KEHRER (*Centralblatt für Gynäkologie*, No. 31, 1897) insists upon the importance of preventing patients with certain chronic and wasting diseases from becoming pregnant. This may also be desirable in cases of extreme pelvic contraction. It would seem more rational under these conditions to render such women sterile than to resort to the inevitable alternative of artificial abortion after pregnancy has occurred. None of the ordinary preventives is absolutely certain, at least in the hands of the laity.

Since removal of the adnexa is followed by climacteric disturbances, the writer suggests that a woman may be rendered sterile by simply dividing and ligating the tubes, as is practised by some operators during the performance of Cæsarean section. From experiments on rabbits he found that this procedure was not followed by either hydro- or pyosalpinx, as might have been inferred. He accordingly applied this method to the human subject in the following case. A woman, aged twenty-seven years, had borne six children, two of whom died soon after birth, and the rest were either idiots or malformed. A seventh pregnancy was terminated artificially at the fourth month on account of the wretched condition of the mother, which had grown steadily worse after every labor. After mature consideration, and after the failure of the usual methods of preventing conception, it was decided to accomplish this result by surgical means. The usual anterior vaginal incision was made, as in vagino-fixation, the fundus uteri was drawn down into the wound, and each tube was ligated in two places near the isthmus, and divided between the ligatures, care being taken not to include the vessels. The uterus was sutured in a position of anteflexion. Convalescence was normal, and the succeeding menstruation appeared at the usual time.

The advantages claimed for this method are simplicity and the absence

of subsequent disturbances, especially atrophy of the genitals and the extinction of sexual desire. Should the adnexa be diseased, they are, of course, removed. The writer adds that this operation should only be performed as a last resort, at the request of the family physician, as well as of the husband and wife. In order to avoid subsequent complications, the written consent of the parties interested should be obtained. The criticism might be offered, he concludes naïvely, that total abstinence would accomplish the same result, but experience shows that it is practically impossible to maintain this restriction.

The Results of Ovariotomy for Malignant Tumors.—KRATZENSTEIN (*Zeitschrift für Geb. und Gyn.*, Band xxxvi., Heft 1) reports the results of operative interference at the Berlin clinic in one hundred cases of carcinoma and sarcoma of the ovary, both primary and secondary, between the years 1879 and 1892. 28 per cent. died, 11 per cent. from sepsis. Of the remaining seventy-two cases, thirty-four had a recurrence, all but two having terminated fatally. There was no recurrence in the cases of fibro-sarcoma, which the writer adduces as an argument against the malignant character of these neoplasms. In 36 per cent. the patients were well at periods ranging from five and one-half to fourteen and one-half years after operation.

These favorable results justify the removal of malignant and ovarian tumors, but in order to secure the best results the greatest care should be exercised to avoid inoculation of healthy tissue with cancerous or sarcomatous material during the operation, by making a free incision previous to puncturing the cyst, and separating adhesions with unusual gentleness in order to avoid tearing the neoplasm. Above all, the importance of an early diagnosis and operation must be emphasized.

Differential Diagnosis Between Appendicitis and Diseases of the Adnexa.—SONNENBURG (*Deutsche med. Wochenschrift*, No. 40, 1897) calls attention to the difficulty of diagnosis, especially in cases in which the appendix is of unusual length or the abscess is situated low down. The immobility of the latter is an important point, though the same peculiarity is noted in carcinoma of the ileo-cæcal region with exudate. In cancer, however, stenosis of the gut is apt to be present.

The writer believes that the relative frequency of appendicitis in the male has been exaggerated, since in his own experience 60 per cent. of males and 40 per cent. of females were affected. The comparative immunity of women from the more severe sloughing processes may be due to the fact that in this sex the appendix has an additional blood-supply through the appendiculo-ovarian ligament, a special fold of peritoneum connecting the process with the right ovary.

Appendicitis is more likely to be mistaken for inflammatory disease of the right ovary and tube than the reverse. The history of previous pelvic trouble, especially of the extension of gonorrhœal infection, is important. It is rare for inflammation of the tube to occur without previous disease of the uterus. The situation of the tumor at the right horn of the uterus and the absence of intestinal symptoms are important. The exudate surrounding diseased adnexa is readily felt per vaginam, being usually situated in

Douglas's pouch. Pain and tenderness are noted at a lower level in tubal and ovarian disease, the pain seldom being referred to the stomach and umbilical region, as at the outset of appendicitis, while there is less general disturbance. Tympanites is more marked in connection with the latter.

The Surgical Treatment of Diffuse Peritonitis of Pelvic Origin.—WINCKEL (*Centralblatt für Gynäkologie*, No. 38, 1897) believes that the surgical treatment of diffuse peritonitis originating in disease of the genital tract is capable of more extended application than formerly. It is probable that from 70 to 80 per cent. of cases of tubercular peritonitis are curable by abdominal section, although five years should elapse without recurrence before the cure can be called positive. Removal of the exudate, and improvement in the circulation and respiration are factors in effecting a cure; the degree in which this is influenced by the admission of air, light, and chemical agents is still problematical. It is doubtful whether irrigation of the peritoneal cavity is desirable; at least only sterilized water should be used for this purpose. Affected tubes and ovaries should be removed only when this can be done easily. Drainage is unnecessary. Vaginal section is not applicable to these cases.

In peritonitis of gonorrhœal origin the tubes should be extirpated, the ovaries resected, and the peritoneal cavity simply sponged out, not irrigated. Drainage is not necessary unless a pyosalpinx or secondary abscess has ruptured into the peritoneal cavity, when the vagina offers the best route.

In post-operative peritonitis the wound is partly reopened and the pus is thoroughly evacuated without irrigation. Drainage is indispensable, through the wound, or per vaginam, if there is a collection in Douglas's pouch.

Surgical interference is indicated in diffuse puerperal peritonitis when the fact of suppuration can be established. About thirty cases have been reported, with a mortality of 80 per cent., as opposed to 73 per cent. with expectant treatment. Most of the recoveries were in cases of from one to two months' standing, acute cases being most unfavorable. A free abdominal incision should be made, with subsequent irrigation and drainage. The adnexa should be removed only if they form pus-foci. Vaginal hysterectomy is permissible in desperate cases alone.

Diffuse peritonitis due to rupture and suppuration of cysts, abscesses and ectopic sacs, and torsion of the pedicle is nearly always fatal without prompt interference. Drainage is to be employed only when pus-foci remain.

Cure of Gonorrhœal Affections of the Female Genital Organs.—MIHAJLOVITS (*Ibid.*) notes the frequency with which these are arrested spontaneously, though with damage to the adnexa, and resulting sterility. He reports the results of treatment in 140 successful cases. Solutions of nitrate of silver from 1 to 1000 to 1 to 3000 were poured into the vagina through a cylindrical speculum, the cervical canal being swabbed out with the same. In cases of gonorrhœal endometritis the uterine cavity was irrigated with the same solution.

New Operation for Cystocele.—MARSI (*Ibid.*) describes the following operation: A longitudinal incision is carried through the mucous and submucous

layers of the anterior vaginal wall, from the anterior fornix to the lower end of the urethra. At each end of this incision a small transverse one is made on either side, and the two lateral flaps thus marked out are dissected off. Interrupted sutures of catgut are passed through the base of the right-hand flap, beneath the median raw surface, emerging at the base of the opposite flap. The flaps are then replaced over the first line of sutures, and their opposite edges are united by a continuous suture of catgut. The result is not only the removal of redundant tissue, but the formation of a new supporting column in the median line of the anterior vaginal wall.

Best Method of Extirpating the Cancerous Uterus.—GOUBAREFF (*Ibid.*), in a discussion before the International Medical Congress at Moscow, affirmed that the operation of the future for the removal of the cancerous uterus was the abdominal, since it allowed thorough removal of affected glands, such as was practised in amputation of the breast.

KÜSTNER believed that in early cases the vaginal route was preferable, the thorough use of the cautery being advisable to prevent primary wound-infection. Freund's operation undoubtedly permitted freer access to the diseased parametric tissues, but was more dangerous than vaginal hysterectomy. He preferred to close the vagina and to drain through the vaginal wound, since his mortality after suturing the peritoneum, and also after draining per vaginam, was 50 per cent.

OLSHAUSEN said that he had ceased to operate in cases in which the disease had extended beyond the uterus; for those who desired to do so, the abdominal route was undoubtedly the best. Contrary to the common belief, the prognosis as regards a radical cure was better in cases of carcinoma of the cervix than of the portio vaginalis, since in the former the disease could often be entirely removed, while in the latter the vagina was early involved. He uses catgut ligatures, fixes the stumps in the wound and closes the peritoneum.

The Modern Treatment of Fibroids.—LAWSON TAIT (*British Medical Journal*, March 27, 1897) reaffirms his former opinion that in the case of multiple fibro-myomata extirpation of the adnexa is the operation of choice, his mortality having been only 1 per cent. Out of 108 patients all but two were examined five years after operation. It is important to remove entirely both ovaries and tubes. He entirely rejects intra-peritoneal treatment of the stump, as well as removal of the entire uterus, practising only the extra-peritoneal method.

The Clinical Significance of Retroflexion of the Uterus.—WINTER (*Centralblatt für Gynäkologie*, No. 25, 1897) examined three hundred women from two to ten months after delivery, and found the uterus retrodisplaced in thirty-six, or 12 per cent. Eleven had no symptoms, while in the remaining twenty-five the symptoms were due to complications other than the displacement in all but four. Ninety others under treatment for retroversion were carefully observed with the view of determining how far their symptoms were due to this condition alone, with the result that in eighty-four other complications existed (pregnancy, menorrhagia, prolapsus, disease of the adnexa, and perimetric tissues) which were the real causes of their sufferings.

The writer arrives at the conclusion that the symptoms usually ascribed to retroflexion—dysmenorrhœa, menorrhagia, sterility, and tendency to abortion—are more often due to complications than to the displacement itself.

THEILHABER (*Ibid.*), in discussing the same subject, criticised the common explanation of the reflex symptoms accompanying retroflexion, as follows: 1. Pressure of the displaced organ upon the bladder, rectum, and pelvic nerves is regarded as the cause of many of these symptoms; but this is disproved by the fact that the weight of the uterus is too slight to cause such a result, while the rectum and pelvic nerves are sufficiently protected from such pressure. 2. Venous congestion has been frequently described, due to supposed torsion or obstruction of the veins in the broad ligaments, but this is prevented by the free anastomoses which exist. Moreover, one never finds in examining such displaced uteri either varices or infarcts, such as would result from long-standing hyperæmia. 3. The so-called reflex neuralgiæ, paralyses, etc., formerly attributed to retroflexion are now generally regarded by neurologists as of purely hysterical or psychical origin. The writer also calls attention to the fact that after the retrodisplaced uterus has been held in a position of anteflexion the supposed reflex symptoms may persist for several months.

He concludes with the statement that in a large proportion of his own cases of retroflexion (as well as in upward of four hundred cases in Landau's clinic), permanent good results were obtained by symptomatic treatment.

Curettement in Incurable Carcinoma.—BERTON (*Inaugural Dis.; Centralblatt für Gyn.*, No. 43, 1897) reports the results of curettement and cauterization in 100 cases of incurable carcinoma of the uterus, treated in Winckel's clinic. In 60.8 per cent. of the cases a temporary improvement was observed as regarded the hemorrhage and foul discharge; but pain was relieved less often. In 32 cases a moderate rise of temperature followed the operation. One patient died of exhaustion after the curettement had been repeated three times.

Post-typhoid Suppuration in Ovarian Cyst.—PITHA (*Centralblatt für Gynäkologie*, No. 37, 1897) reports a case of ovariotomy for removal of a suppurating cyst, four months after the development of typhoid, being the third on record. Characteristic typhoid-bacilli were found in the cyst-contents. It was evident that the suppuration was a metastatic process due to migration of the bacilli through the wall of the cyst. Their persistence for so long a time showed their vitality, and the fact that they found in the cyst-fluid a favorable culture medium. Werth and Sudeck report cases in which pure cultures of the typhoid-bacilli were obtained eight months after recovery. The pyogenic action of these bacilli is also shown, though it is not certain that they were the direct cause of suppuration.

Vulvo-vaginitis in Children.—MARFAN (*Abeille Méd.*, No. 16, 1897) describes the complications of this inflammation, which may be threefold, viz.: 1. Inflammation of Bartholin's gland, phlegmonous vulvitis, and rectal blennorrhœa; and often urethritis, which may even become hemorrhagic. Metritis, salpingo-oöphoritis, and peritonitis may occur. All these are due to direct

extension of the inflammation. 2. Gonorrhœal ophthalmia, or infection by contact. 3. General infection, as gonorrhœal rheumatism, which may develop as early as the ninth day and involve one joint only, especially the knee, lasting about two weeks. It may be fatal in the newborn. Endocarditis and pleuritis are possibilities. The writer speaks highly of irrigation with permanganate of potash, 1 to 1000, or, if this fails, with sublimate, 1 to 10,000, resorcin 1 to 100, or nitrate of silver 1 to 3000. He also recommends the introduction of pencils containing iodoform and alum.

COMBY (*Gazette des Hôpitaux; Centralblatt für Gynäkologie*, No. 37, 1897) reports three cases of vaginal hemorrhage in young children, one of whom was only two years old, which had been diagnosed as metrorrhagia. Examination showed that the blood came from granulations around the meatus urinarius, while at the same time there was a profuse gonorrhœal discharge. The patients were promptly cured by irrigation with a weak permanganate solution and cauterization of the bleeding spots.

MEJIA (*Gaz. hebdom. de mêd. et de Chirurgie*, No. 29, 1897) calls attention to the fact that in rare instances diffuse peritonitis may result from extension of a vulvo-vaginitis upward to the uterus and tubes. The prognosis is nearly always unfavorable. The diagnosis is difficult, but the condition may usually be inferred in a case of gonorrhœal vulvo-vaginitis in which violent diffuse peritonitis develops, appendicitis being excluded. Abdominal section offers the only prospect of saving the patient, and must be performed as early as possible.

Effect of Abdominal Section on Peritoneal Tuberculosis.—WESTPHAL (*Centralblatt für Gynäkologie*, 1897, No. 41), after making a series of clinical observations, decides that none of the theories advanced to account for the curative effect of cœliotomy in peritoneal tuberculosis are entirely satisfactory. The removal of bacilli or of exudates, diminution of the intra-abdominal pressure with secondary hyperæmia, emptying of lymph channels—these play only a minor part in the healing process. It does not seem credible that diseased conditions which have existed for months or years could be favorably influenced by changes which are necessarily only transient. The writer believes that, aside from all these, the main factor is doubtless the free admission of the external air to the peritoneal cavity, which in some unexplained way, under favorable conditions, effects a cure.

Carcinomatous Degeneration of Uterine Fibroid.—RADEMACHER (*Inaugural Dis.; Centralblatt für Gynäkologie*, 1897, No. 41) describes an interesting specimen, removed post mortem, which at first sight seemed to be one of true carcinomatous degeneration of a fibro-myoma. But, on closer study it was evident that the two fibroid tumors affected were really invaded by outgrowths from an adjacent malignant neoplasm of the corporeal endometrium. The mucosa covering one of the interstitial tumors was entirely replaced by cancerous tissue.

The writer affirms that all cases of so-called carcinomatous degeneration of uterine fibro-myomata are doubtless examples of secondary infiltration of cancer-cells from the diseased endometrium, as in the case cited.

PÆDIATRICS.

UNDER THE CHARGE OF

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Hysteria in Children.—STEINER (*Jahrbuch f. Kinderheilkunde*, 1897, Bd. xliv. S. 187), in an elaborate paper containing a most complete bibliography, records seven personal observations, one of which is sufficiently striking to be quoted.

The patient was a boy, aged five and a half years, whose symptoms were more or less those of tubercular meningitis. He had ptosis, strabismus, headache, slowing and irregularity of pulse, and facial paralysis. The absence of fever, vomiting, constipation, retraction of the head, together with the appearance of not being seriously ill, suggested the possibility of hysteria, the stigmata of which were found to be present. Other observations less typical are given, such as frequent vomiting independent of lesion of the gastro-intestinal canal (two cases in girls, aged ten and thirteen years); inability to swallow solid food after extraction of a foreign body from the œsophagus; visual hallucinations. All these children, who presented the stigmata of hysteria, were cured by psychotherapy.

Prophylaxis of Nephritis in Scarlatina.—ISIDORO PUJADOR Y FAUVA (*Twelfth International Congress, Moscow, Section of Pediatrics*) highly commended the use of oil of turpentine hypodermatically or by mouth in the treatment of scarlatina, and as a means of preventing renal complications. The plan was suggested by the success of Fochier, of Lyons, in treating puerperal streptococcic infection by hypodermic injections of turpentine. A case of complete anasarca from nephritis in the period of desquamation was cured rapidly, according to the reporter, by means of such injections without other treatment. More than 120 cases of scarlatina, in children and in adults, some of which were very grave, were treated by turpentine internally, and all were cured, albuminuria not being observed in any of the cases, though the patients were permitted to be in the open air in less than three weeks from the time of the attack.

A manifest diminution in the symptoms having been observed within three hours after the injection, and the turpentine having been detected by its violet-like odor in the urine, the author concludes that the drug acts immediately by absorption, changing the microbic metabolism by neutralizing toxins or increasing phagocytosis. This drug, employed internally from the beginning of the disease, has never been observed to produce albuminuria.

Beyond an irritant effect from the local use of turpentine (which may be

readily avoided by the addition of an alkali, like sodium bicarbonate) the drug is harmless to the organism if not used in doses greater than a gramme for young children, and not exceeding three grammes for adults, administered as a potion (emulsion) or in perles. It is necessary to watch the digestive apparatus and to suspend the drug for two days, replacing it by saline laxatives.

Thyroid Therapy in Idiopathic Tetany.—MAESTRO (*Riforma Medica*, 1896, vol. ii., Nos. 40, 41) reports that raw or dried thyroid, in dose of 2 to 4 gm. daily, is well borne, and has given him very good results in the treatment of the idiopathic tetany of infancy. Under its influence the attacks become less frequent, the duration of contraction is shortened, and complete cure results.

The Status of Lumbar Puncture.—This subject was thoroughly discussed in the Pædiatric Section of the recent International Medical Congress in Moscow.

VON RANKE (Munich), after a short historical sketch, referred to the harmlessness of the procedure, but as to its therapeutic value was forced to conclude that, in spite of all theoretical considerations, it must be confessed that the method offers nothing of value in the treatment of tuberculous meningitis. In more than 100 collected cases in which puncture had been made, not one had been saved. With reference to its diagnostic value, the speaker stated that in spite of the most careful search the bacillus had not been detected in the fluid from a number of cases which presented no difficulty in diagnosis as determined by their clinical symptoms and course. Its value in differential diagnosis he believed to be still *sub judice*.

MONTI (Vienna) reported that he had in the past two and a half years made the puncture in twenty-one cases—fifteen of basilar tuberculous meningitis, five of epidemic cerebro-spinal meningitis, and one of acute hydrocephalus following cerebro-spinal meningitis. He concludes that in basilar tuberculous meningitis the procedure offers only occasional help in diagnosis, and cannot invalidate the clinical diagnosis. Therapeutically, in tuberculous meningitis, lumbar puncture is without value. In acute cases of epidemic cerebro-spinal meningitis, examination of the fluid may help to establish the diagnosis; but after a week's duration of illness the result is usually negative. Repeated punctures in the acute stage of epidemic cerebro-spinal meningitis are not without benefit, and should lessen the mortality from this affection. Puncture of the fontanelle, with or without injection of iodine preparations in chronic hydrocephalus, has so far given no practical results.

RACZYNSKI (Cracow) subjected twenty-six cases of hydrocephalus to lumbar puncture. Twenty-one of these were cases of the congenital or acquired disease, in which the cause was unknown; the remaining five cases followed cerebro-spinal meningitis. Seventeen cases of the first group were still increasing in size, and in these, while temporary reduction in the measurement of the skull was observed for several days after puncture, the condition rapidly returned, and the skulls reached even greater dimensions. Not a single case was cured. The remaining four cases of the first group had reached an extreme stage of distention. In these the dropsy was relieved, but the

children could not walk. The reflexes remained exaggerated and the gait spastic.

In the second group of cases (consecutive to cerebro-spinal meningitis) the headache and feeling of distention were partially relieved.

A Chemical and Bacteriological Study of Hydrocephalic Fluid.—CONCETTI, of Rome (*Wiener klinische Wochenschrift*, 1897, No. 42, S. 934), finds that hydrocephalic fluid is sterile and faintly alkaline and of a specific gravity varying from 1005 to 1010, having no toxic action upon animals. The proportion of albumin remains constant (about 0.25 per cent.), despite repeated punctures. Glucose has never been found, nor has peptone, urea, mercury, or potassium iodide. Salts are present in small quantity. It therefore has the same chemical composition as physiological cerebro-spinal fluid, and consequently is not an exudate or transudate, but a true secretion.

The author has also studied, bacteriologically, the hydrocephalic fluid obtained in pathological conditions in which streptococci, staphylococci aurei et albi, pneumococci, and bacteria coli have been found. A series of observations has shown that their growth is checked, and that upon staphylococci an agglutinative effect is produced. The movements of the bacterium coli are rendered more sluggish. With inoculated animals he found that death occurred less quickly than in control-animals. At autopsy were found only slight superficial anatomico-pathological lesions, and often no changes at all were present.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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Visceral Changes in Extensive Superficial Burns.—The association of lesions of the internal organs with extensive superficial burns has long been known, and numerous theories have been proposed to explain their occurrence. The most recent of these is the theory that the internal lesions are the expression of a reaction to some poisonous substance in the blood, and based upon this theory is the conception that death, in cases of extensive superficial burns, is the result of a toxæmia of some kind. Nevertheless, up to the present time, all efforts to obtain the toxins responsible for this condition from the blood have either wholly failed or have yielded inconclusive results.

In the hope of shedding some light upon this obscure subject, BARDEEN has carefully studied the lesions present in the internal organs from five cases of extensive burns afforded by the Pathological Laboratory of the Johns Hopkins Hospital (*Journal of Experimental Medicine*, ii., No. 5, p. 501). In the nature and distribution of the lesions, Bardeen finds confirmation of the toxæmia theory.

The material studied was from children from sixteen months to eight years of age, and in all the cases the burns had been very extensive and death had

occurred quickly—in from four to nine and a half hours after the injury. The lesions in the internal organs were strikingly alike in all.

The notes of the autopsies recorded the chief gross morbid changes as being cloudy swelling of the liver and kidney, softening and enlargement of the spleen, and, above all, swelling of the lymph nodes and of the gastro-intestinal lymph nodules. Moderate hyperæmia of the thoracic and abdominal organs was also noted. Cultures for bacteria made at the autopsies were negative, except that in one case the micrococcus lanceolatus was obtained from the lungs. The autopsies were all made very soon after death.

The microscope confirmed the naked-eye appearances of parenchymatous degeneration in the liver and kidneys, and revealed in addition marked degenerative changes in the blood. These last were shown more particularly in poikilocytosis and extensive fragmentation of the red corpuscles. Leucocytosis was also observed, associated with evidences of great reproductive activity and foci of degeneration of the bone-marrow. Thrombi were common only in the superficial layers of the skin.

Special interest attaches to the changes in the lymph nodes. These were in all the cases, and everywhere in the body, of the same fundamental character, though varying somewhat in extent and intensity. They consisted essentially of œdema, swelling and fragmentation of the lymphocytes, and in places of distinct areas of necrosis. These lesions were focal in distribution and were most marked in the centre of the follicles of the nodes, or, in other words, in the immediate area of the blood-supply. Similar degenerative changes were also observed in the Malpighian bodies of the spleen.

This distribution of the lesions in the lymph nodes and their similarity to the changes in the nodes observed in many of the infectious fevers, in which bacterial toxins in the blood are believed to be the cause of the lesions, lead Bardeen to the conclusion that the remote lesions in cases of superficial burns are the result of the presence in the blood of toxic substances similar in their action to the bacterial poisons. In fact, similar lesions in the lymphatic structures have been produced experimentally by the intravenous injection of bacterial toxins. The source of the toxic substances in cases of burns is as yet unknown, but that they are of a high degree of toxicity is clear from the rapidity with which the lesions develop.

Serum Diagnosis of Cholera.—ACHARD and BENSAUDE, whose careful work in connection with Widal's test for typhoid fever is well known, report the results obtained by them in similar examinations of the blood from fourteen cases of cholera Asiatica.—*La Semaine Médicale*, 1897, 151.

The serum used for the tests was sent to them from Cairo and from Alexandria, as were also samples of the stools from some of the cases. Bacteriologic examination of these latter confirmed the diagnosis of cholera.

Thirteen of the sera caused very positive agglomeration of cholera bacilli —all in dilution of 1 to 10 or 15, the majority in dilution of 1 to 20, and one even in dilution of 1 to 120. Of these thirteen cases the serum was obtained twice on the first day of the disease, in three instances on the second day, in four cases on the third day, twice on the fourth day, once on the sixth, and once on the twenty-eighth day. The appearance of the reaction in the very early days of the disease is important as increasing its diagnostic value, and

is in contrast to the much later appearance of Widal's reaction in typhoid fever. It is not known whether prodromal symptoms were present in the case whose blood showed the reaction on the first day of the disease.

In the one case which failed to yield the reaction the blood was taken on the third day of the disease, and the patient died on the same day.

Control tests were made with thirty different sera, six from healthy persons and twenty-four from persons suffering from other diseases than cholera. Of these only two showed any agglomeration, and that but slight. Both of these patients were at the time suffering from uræmia. But, notwithstanding these more or less positive results, Achard and Bensaude maintain that no confusion should arise if the rule now generally followed in the serum diagnosis of typhoid fever, of accounting only such reactions as positive which are decided and speedy, be followed also in the case of cholera tests. Thus, in Achard and Bensaude's investigation, if no reaction had developed under the microscope in the course of an hour, the result was set down as negative. In most cases a positive reaction was evident in from five to twenty minutes when the serum was diluted not more than fifteen times. In tubes the reaction developed somewhat more slowly, but was usually evident in from one to two hours at a temperature of 37° C. Dried serum was found to retain its agglomerating power for five months, even when diluted ten times.

The reaction was not in any instance obtained from the stools, indicating that the agglomerating substance is not contained in the dejecta in any considerable quantity, if at all.

Finally, the reaction was tested with cholera cultures from nine different sources, and all were found to be similarly affected. Vibrio-Massauah, Vibrio-Metschnikovi, and the Finkler-Prior spirillum developed no reaction.

As regards the technique of the test, it is recommended that germs from agar cultures be employed in preference to bouillon cultures, because of the frequent tendency of cholera bacilli to grow in colonies in broth. To avoid any confusion of such colonies with agglomerated clusters, Achard and Bensaude made use of thoroughly mixed suspensions in normal salt solution of the germs from agar cultures.

While the results of their investigation are regarded by Achard and Bensaude as of much suggestive interest, they are not put forward as conclusively indicative of the value of the test in the diagnosis of cholera, because of their comparatively limited number.

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